

A monthly magazine devoted to
the practical management of municipalities.

City Government

NOVEMBER.

FEATURES:

American Society of Municipal Improvements
Report of the Chicago convention and some of the important reports presented.

City Government of Nashville
John L. Kennedy, of the Board of Public Works and Affairs, tells how the municipal business is handled.

Advantages of an Asphalt Coating Laboratory
N. P. Lewis, of the Bureau of Departments of City Works, tells of his experience.

Saving Street
S. J. Harlan, of the Marietta, Ohio, City Council, describes how he saved his city.

Modern Street Cleaning Construction
F. W. C. ... of Minneapolis tells how to clean modern city streets.

Excavations
George ... of Williamsport, Pa., describes an important subject.

Using Public Works
A. D. ... of ... describes his ...

Repairs of
E. B. ... describes an interesting ...

Road
Joseph ... describes his ...

Madison
Describes ...



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City Government Pub. Co.,

150 Nassau St, New York

Send me your publication beginning first issue number one.

Jas D. Phelan,

Mayor Elect

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 (WHERE ANY REPLY SHOULD BE SENT.)

CITY OF NEW YORK.
 OFFICE OF THE MAYOR.

August 12th, 1896.

City Government Publishing Company,

No. 301 American Tract Society Building,

New York City.

Gentlemen:-

I am in receipt of your recent favor, together with copy of the first number of "City Government", a monthly magazine devoted to the practical affairs of municipalities.

Municipal government, especially in our largely crowded localities, is the most serious test of self-government under our representative system. To provoke discussion and an exchange of views on this subject is desirable and should be beneficial.

Very truly yours,

W. S. Thorne
 Mayor.

City Government,

New York.

Gentlemen:

I have received your sample copy of "City Government". I have not had time to examine it as much as it deserves, but the general make up of the paper commends itself, and the subjects treated are of vital interest to, not only the dwellers in cities, but all patriotic Americans. The problem of city government is one of the most difficult the Republic has to handle. I have no doubt the good sense of our people will solve this problem right, and in the mean time judicious agitation will assist greatly.

Wishing you success in your new enterprise,

I am,

Very truly yours,

C. P. Walbridge
 Mayor



JAS. M. JONES
 Mayor

Nov. 2nd, 1896

City Government Publishing Co.,

150 Nassau St.,

New York.

Gentlemen:-

Your "City Government" strikes a responsive chord in all who are interested in the great and grave problem of municipal government. It is splendidly edited, treating in a masterly manner the questions it discusses. Its scope of usefulness is large, and as an educator it can scarcely fail to accomplish great and good results.

The problem of city government is a business proposition, and your magazine will doubtless materially assist in its proper solution.

Yours truly,

Jas. M. Jones
 Mayor.



Mayor's Office
 Brooklyn, N.Y. Sept. 4, 1896

Permit me to commend the enterprise shown in the publication of "City Government" and to wish it success in the field it has chosen. There are so many serious problems in administering municipal affairs that every effort in the direction of their solution should be readily welcomed.

T. M. Munster
 Mayor of Brooklyn

CITY GOVERNMENT.

(Entered as Second-Class Matter at the New York, N. Y., Post Office, August 12, 1896.)

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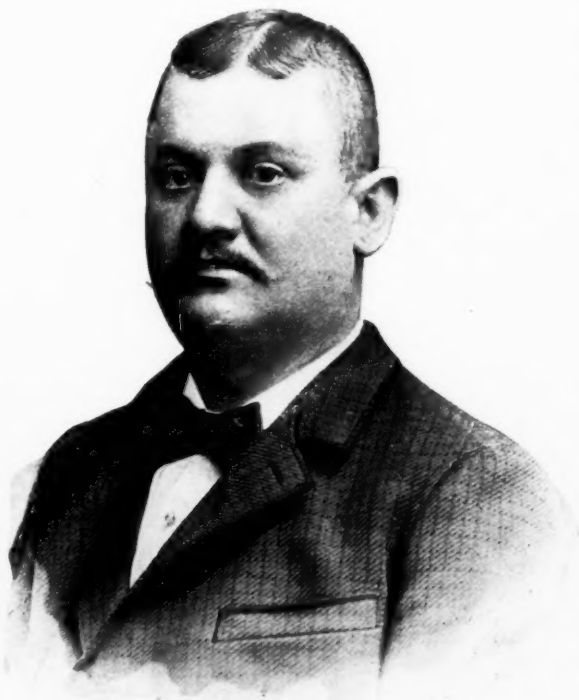
NEW YORK AND CHICAGO, NOVEMBER, 1896.

\$3 A YEAR.

AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS.

In this issue of the CITY GOVERNMENT will be found a number of the papers read at the recent Chicago convention of the American Society of Municipal Improvements. All of these papers were prepared by eminent authorities on the subjects treated, and they will doubtless prove of great value to city officials and tax payers generally.

Officers of the society for the ensuing year were elected as follows: President, August Herrmann, Cincinnati; vice-presidents, E. B. Guthrie, Buffalo; W. R. Kerr, Chicago, and Ernest Adam, Newark; secretary, D. L. Fulton, Allegheny; treasurer, J. L. Kennedy, Nashville; committee on finance, L. W. Rundlett, St. Paul, F. J. O'Brien, Oswego, and G. F. Munro, Omaha.



26 AUGUST HERRMANN, PRESIDENT.

President Herrmann appointed the standing committees as follows:

Street Paving—A. D. Thompson, Peoria, Ill.; Nelson P. Lewis, Brooklyn, N. Y.; W. G. Wilkins, Allegheny, Pa.
Electric Street Lighting—J. A. Cabot, Cincinnati, O.; F. W. Cappelen, Minneapolis, Minn.; J. H. Pearson, Louisville, Ky.
Sewerage and Sanitation—George H. Frost, Plainfield, N. J.; M. A. Downing, Indianapolis, Ind.; Peter Weidner, Dayton, Ohio.
Water-works and Water Supply—E. H. Keating, Toronto, Ontario; M. L. Holman, St. Louis, Mo.; M. R. Sherrerd, Newark, N. J.
Taxation and Assessment—G. F. Munro, Omaha, Neb.; S. C. Hathaway, New Bedford, Mass.; R. E. Horner, Parkersburg, W. Va.
City Government and Legislation—C. C. Brown, Indianapolis, Ind.; C. C. Waddell, Chillicothe, Ohio; L. E. Farnham, Camden, N. J.
Disposition of Garbage and Street Cleaning—Dr. J. L. Hess, Cleveland, Ohio; Frank V. Matty, Syracuse, N. Y.; S. Brockman, Milwaukee, Wis.
Review—Lansing H. Beach, Washington, D. C.; Capt. M. M. Drake, Buffalo, N. Y.; E. W. Boynton, Davenport, Iowa.

Nashville was selected as the place for the convention of next year.

August Herrmann, the new president of the society, is the president of the board of administration of the city of Cincinnati. He has taken a lively interest in the society ever since its organization and will prove an efficient and energetic president. The Nashville convention will surely be a success.

MODERN STREET RAILWAY TRACK CONSTRUCTION ON ASPHALT PAVED STREETS.

BY F. W. CAPPELEN, CITY ENGINEER OF MINNEAPOLIS, MINN.

The travelling public today is very much more extravagant in its demand for comfort—and, we might say, luxuries—than it was a few years ago. This refers not alone to the equipment of a railroad, but also to the roadbed and track, and it is a common remark to hear that such and such a road is preferred to any other because of its easy track and well maintained roadbed. This is as it ought to be. Upon the condition of the track depends the successful operation of the road to a large extent; also the life of the rolling stock and the safety of life and goods transported by the railway company.

As an illustration of the demand for first-class equipment the writer is reminded of an incident that occurred in Minneapolis during this season's fall festivities. A great many floats participated in a magnificent parade one evening, and among them appeared, placed upon a small truck, a little 2x4 street car for one mule, labelled with a large sign thus:

"We rode in this in '74 and were happy."

Immediately behind this came a beautiful, latest-improved electric car with this:

"We ride in this today and kick."

On ordinary railroads the entire track is, practically, constantly patrolled, so that bed and track can be kept in as good condition as the management desires. Low joints are readily raised, bad ties easily exchanged for good ones, bolts tightened, etc., as everything is in plain view to the men in charge. The conditions are entirely different on a street railway.

After the track is down nothing is visible but the top or running surface of the rail, and when a joint sags it means the ripping up of the pavement of the street at that point to do the required work of putting the track in proper alignment and to proper grade. The same is the case when removal of ties or rails becomes necessary. In addition to the cost of properly caring for the track itself comes the cost of repairing the pavement between the tracks, it being taken here for granted that the corporation owning the street railway will at least care and pay for the pavement in the space from outside to outside rail on a double-track road. The repair bills in a street railway system operated with horses were comparatively small, although the track construction generally was poor. The cable roads made far better track construction an absolute necessity, and companies that attempted and are attempting light and poor track construction for electric street railways have found, or will find, that the expense for maintenance of track is a big item.

The ordinary horse car weighs about 11,000 pounds, the cable car 12,000 pounds, and the electric car from 19,500 to 43,000 pounds. These figures speak for themselves. The city of Minneapolis was one of the first in the United States to change its horse railway system into an electric system, and made the entire change of 100 miles in one year.

The company, however, did not change track and rail very much, but used a great amount of four-inch light rail—forty-five pounds and fifty-four pounds per yard. The Johnston seventy-eight-pound girder rail was also used, and, after considerable wrangling, the city Council permitted the company to use the Shanghai six-inch seventy-pound T rail on some new extensions.

As most of the streets were paved with six-inch cedar block on two-inch foundation plank, a great deal of trouble was experienced with the pavement next to the rails and between them.

The ties had to be cut down, or four-inch blocks were used with the six-inch "T" rail. Strips of wood were placed along the rail to form the groove for the flanges of the car wheels to run in. The rails were spiked to pine ties on two-foot centres, and most anything used for ballast.

In a good many cases cobblestones were used between the rails. The city charter, however, provides that the space between rails must be paved with the same material as the balance of the street, but the City Council would occasionally grant the company the right to do differently. After a while asphalt was ordered on certain streets, and the street railway company was obliged to look at the matter of track construction in a different way, but finally got permission to pave between rails and tracks with granite, and the city put granite toothings on the outside of the rail. The six-inch seventy-eight-pound Johnson girder rail was used, but no particular care was taken in the ballasting of the tracks, and the result was, of course, that it settled and the asphalt broke away after a short period.

This year several principal down-town streets were ordered paved, and the writer was delighted to learn that the street railway company would do everything in its power to construct a first-class track in every respect.

For all crossings and curve work the so-called Johnson (Pa.) guaranty work was used. All switches and frogs have removable Harveyized steel pieces, and it is expected that this work will stand, in the worst places, at least nine years. The life of the old frogs, etc., did not exceed five years, and they were generally pretty bad after two years' wear.

Ties were used for this part of the track, and they were set in concrete, and the entire intersection and cross-overs were paved with fine cut granite, set in cement mortar, and the joints were filled with cement.

For all straight track work 60 feet long "T" rails were used. The rail is the American Society, 80 pounds, five-inch base by five inches high, standard. Three methods of constructing the track were used.

The same company owns the street railway system both in Minneapolis and St. Paul, and work was commenced in St. Paul somewhat earlier than in Minneapolis. The first plan was used there in the following manner: After the sub-foundation had been thoroughly rammed or rolled, the necessary slight excavation was made for a concrete beam to run longitudinally under the rail. This beam was eight inches in depth and fifteen inches wide, and constructed so that the top surface would be at the proper grade to receive the base of the rail. This beam was formed between boards. The concrete used consisted of one part Empire Portland cement, two and one-half parts of sand, and four and one-half parts crushed rock. Upon the beams, after they had set, the rails were placed and tied together every ten feet with 2x3-8 tie rods set on edge.

After the rails were lined up the joints were welded, room being left in the concrete every sixty feet for the joints. The street railway company experimented last winter with the so-called Falk cast welded joints and adopted them for all future work. The joint is made in the following manner: The rails where the joint is to be made are first thoroughly cleaned with files and emery paper; cast-iron moulds are then placed around the joint, held in place with clamp screws, both horizontally and vertically. It was found necessary to have a very heavy vertical screw to prevent the joint from heaving on account of expansion due to the heat developed.

After the moulds were placed the molten metal was poured and the joints completed. After cooling the moulds were removed and any rough edges left were trimmed off. The joint is made so that a flange way is formed in the cast. The company owns two of the so-called cast welding machines, made by the Falk Manufacturing Company, of Milwaukee, Wis. The cost of the machine is about \$2,500, and the capacity 8,500 pounds per cast. The joint for the eighty-pound rail requires about 138 1-2 pounds of metal, and the cost per joint is about \$2. This includes the cost of fixing the rails for the joint. A forty-five-pound rail requires 102 pounds for a joint, and a fifty-four-pound rail requires 115 pounds for a joint. A mixture of half pig and half casting scraps gives the best results. The furnace is loaded in layers, beginning with wood, coke and pig, coke pig, etc.

After the joints were made Milwaukee cement concrete, six inches in thickness, composed of one part of cement to two and one-half parts of sand and four and one-half to five parts of rock, was placed to proper grade to receive two and a half inches of asphalt pavement across the entire street and between rails and tracks, leaving enough space on the inside of the rails to place along the same granite blocks four and a half inches deep, three and a half inches wide, and nine inches long.

These blocks were, however, set simultaneously with and in

the concrete, being separated from the head of the rail by a one and a fourth-inch wooden strip, so as to form the flange way for the car wheels. After the strip was removed the lower two and a half inches of the space left was filled with cement grout, and the upper two and a half inches to the top of the rail was filled with asphaltic cement, consisting of about 30 per cent. asphalt and the balance limestone dust.

This mixture remains soft enough to form the proper groove when the first car is run over the track. The joints between the granite blocks were filled with asphaltic cement.

After the track work was completed as described, the asphalt pavement proper was put down flush to the top of the rails everywhere but where the groove was.

Considerable trouble was experienced in St. Paul with the rails after the joints had been cast. In a little while about 1,500 feet of track looked like a snake, and it was very difficult to get the track back in line. In fact, the superintendent of the street railway company thought he would be obliged to cut the rails, but he got along without doing so. When the work came up in Minneapolis this matter was discussed, and it was thought advisable to proceed in another way.

Ties were placed about every six feet to eight feet apart, and the rails were lined up and temporarily fastened to the ties; then the cast-iron joints were made, and the concrete beam put in between ties in the same manner as in the first case. The ties were then pulled out, the space filled, and the balance of the street concreted and completed as before.

The rails were also spiked to the concrete beam as soon as it was in place. The track was kept in perfect alignment this way. After further discussing the work as it progressed, a further modification in constructing the beam was adopted. As it was not always possible to follow up with the concrete work of the street proper as fast as the beam was built, a good bond was not obtained between the beam and the other concrete, so the method was changed this way: The ordinary concrete was put down outside and inside the rails, forming a rough groove about eight inches deep, fifteen inches wide at the bottom, and eighteen to twenty inches at the top.

In this groove, as soon as it was built, the beam concrete was placed; otherwise the construction was as in the second case.

The cost per foot of rail for the beam construction, only including grading for the same, was, in the first case, 26 cents; in the second case, 26 cents, and in the third case, 27 cents. The filler cost about 5 cents per foot.

The cost of putting down temporary ties and laying, lining, and surfacing one mile of single track preparatory to putting in concrete beams, and including labor and material used in welding the joints was (approximately) \$850.

In connection with this change of track construction the writer changed the cross sections of the streets as well as the intersections, where repaving was done. All the old streets have very deep gutters, from twelve to fifteen inches, and even more. This made it necessary at intersections to use bridges over the gutters at the corners, making them unsightly, in the first place, and generally the gutters were easily filled under the bridges, and, finally, too much space of the street was lost.

Wherever repaving has been done this was changed, so that now the gutters are only six to eight inches in depth, with corners of the streets rounded off to twelve-foot radius and the street raised at the corner, so that only a step to the pavement of from four to five inches is needed.

Drainage is taken care of by putting in double catch basins. This makes beautiful intersections and pleases everybody.

On a fifty-foot roadway paved with asphalt and without tracks, eight-inch gutters and ten-inch crowns are used; with tracks, eight-inch gutters and seven-inch crown from rail; on streets before changed, fifteen-inch gutter and twelve-inch crown.

The cost per mile of a double track constructed as described would be about:

Cost of putting down temporary ties and laying, lining, surfacing, joints, etc., of double track.....	\$1,700 00
Beam work, etc.....	6,968 00
*Rails and tie bars.....	9,400 00
Asphalt paving at \$2.43 per square yard, ten-year guaranty.....	15,840 00

Total per mile.....\$33,908 00
This is a very heavy expense, and it is sincerely hoped that the construction will prove satisfactory.

About two and a half miles have been completed this season in Minneapolis.

As far as the writer knows, the construction has only been used in Montreal, Toronto, and perhaps Detroit. In the two Canadian cities the cast welded joint was not used. The writer would suggest that a different T rail be used, viz.: a rail six inches high, with a six-inch base. The four and a half-inch granite blocks ought to be five and a half inches deep, and the six-inch base would give a better bearing on the concrete beam.

It may be of interest to know that the Warren-Scharf Asphalt Paving Company claims a patent on the method of forming the asphaltic flange way before referred to. This company did all the paving on streets with car tracks, and E. M. Ayers, using Utah lime rock asphalt, laid all streets without tracks.

*Sixty-foot rails cost \$2 a ton more than thirty-foot rails.

ADVANTAGES OF AN ASPHALT TESTING LABORATORY.

BY N. P. LEWIS, ENGINEER OF STREET MAINTENANCE AND REPAIRS, BROOKLYN.

It must be admitted that the chemical properties of asphaltum and the other materials which are combined to form the asphalt pavement usually laid in this country at the present time, what change, if any, these elements undergo when mixed together, and what physical and chemical changes take place in the pavement after subjection to street traffic and exposure to the weather, are subjects which to the municipal engineer are usually shrouded in mystery. Nor is this surprising. Such pavements are usually laid under a guarantee of from five to fifteen years, and the contractor is very likely to take the ground that he knows from long study and experience just what treatment and mixture will give the best results with his particular material. And if the engineer ventures to insist upon any variation from the methods he wishes to follow, why he (the contractor) will not be responsible for the results. He will tell you that Prof. —, the company's consulting chemist, has devoted a lifetime to the study of the subject, and has prescribed a certain mixture, and, of course, he knows what will give the best results.

The engineer is thus placed in a difficult position, and is quite likely to accept the contractor's view, while the same is true to a greater degree in the case of the administrative officer at the head of the Public Works Department, who is almost invariably a man without technical training.

The laying of asphalt pavements in American cities has, up to within a very few years, been almost wholly done by one or two companies who obtained their material from a single source, and it was therefore of about the same quality, and, as similar methods were followed, the results were fairly uniform, and, upon the whole, satisfactory.

New sources of supply have recently been developed, and it has frequently happened during the past year or two that, where specifications have been so framed as to admit any material meeting certain specified requirements, five or six bidders have submitted proposals for laying as many different kinds of asphalt. The municipality should be in a position to profit by this competition. Few, if any, of the new companies are able to refer to pavements which have been laid for five years or more, and, time being the best, and, in many instances, the only testimonial of value, the engineer is in doubt as to whether some of the proposals should be considered. It is generally deemed wise to let others do the experimenting, and when results have been assured, profit by their experience. The asphalts furnished from different localities differ very materially in chemical and physical characteristics, and each requires special treatment. Many of the new companies are still feeling their way, and do not seem satisfied as to the best treatment of their material under given conditions of climate and traffic.

The writer's own experience may have been exceptional, but with thirteen contracts carried out by one of the new companies in 1895, he is convinced that not less than six different mixtures were used in laying pavements which would be subject to conditions which were identical.

The engineer is not and cannot be expected to be a chemist, though he should have a general knowledge of the properties of

asphalt, and should be capable of outlining the investigations to be made, while a young graduate of a good technical school, who has made chemistry the special feature of his course, can carry out the work which may be indicated. The writer is not a chemist, and his intention is not to prescribe the best method or any method of conducting a laboratory for the purpose described, but to urge upon municipal officers the necessity of an independent investigation of materials and methods, that they may be able to know exactly what is given them under contracts for asphalt pavements, to correct irregularities and variations in the product, and if results should be unsatisfactory, to indicate the cause and prescribe the remedy. In a word, the engineer should know at least as much about the subject as the contractor.

Judging from the published reports of the engineers of various cities, almost nothing has been done in the line of analysis, or even observation and record, of the pavements after they are laid. With one or two notable exceptions these reports consist merely of a dry recital of the streets which have been paved, the area of the pavement laid, the mileage and total cost. When exceptional efforts are made to be explicit the character of the work is more fully described, the cost of the different items and cost per unit of measure are given. There is little, if anything, which will add to the general information on the subject, or be of benefit to other municipal engineers.

I do not think that the results which may be obtained from observation and experiment should be regarded as personal capital of the observer or experimenter, but should be added to the general knowledge of the subject and given to the profession. Without any desire to be personal, I think an outline of the work done in a modest little laboratory recently established by the writer may be of value.

As the result of an earnest request, the Common Council of the City of Brooklyn authorized the equipment of a laboratory for chemical and physical tests of paving material at an expense of \$1,000. An unused corner on the top floor of the building in which the Public Works Department is housed was partitioned off, and the necessary closets, shelving, fume chamber, gas and water pipes were put in. The services of a young graduate of a local technical school, who had for two years after graduation acted as an instructor in quantitative analysis, were secured at a salary of \$1,000 a year. An outline of the work to be done was given him, the methods discussed, and apparatus and chemicals essential for the purpose were provided. The cost of fitting up quarters was \$365, while that of apparatus and supplies was \$650, an excess of \$35 over the amount appropriated. A list of the supplies purchased it is unnecessary to give, but the items may be summarized as follows:

Glassware (flasks, beakers, condensers, etc.).....	\$ 95
Bottles ("Reagent," "Saltmouth," "Tinctures").....	35
Chemicals.....	70
Platinum (crucibles, dishes, etc.).....	80
Analytical balance.....	60
Balance for large weighings.....	30
Gas stoves, Bunsen burners, ring stands, clamps, etc....	30
Miscellaneous apparatus and accessories.....	250
Total.....	\$650

It should be noted that the laboratory was equipped for general analytical work, it being found that the additional cost required to make it complete was trifling when compared with the expense involved in fitting it for asphalt work alone. It was considered poor economy to prepare for asphalt work only and leave ourselves unprepared to make any simple test or determination not strictly in that line.

Early in May we were prepared for work. The scope of the investigations has thus far been modest, and the analyses made are about as follows:

Frequent visits are made to the plants of the different companies, and samples of crude and refined asphalt, petroleum residuum, or maltha, with the asphaltic cement, limestone and sand are frequently taken, and partial or complete analysis made. The inspector on the street is always provided with a thermometer to test the temperature of the paving mixture as delivered and laid. Samples of the new pavement are taken from each block, and the location actually recorded. As many as possible of these samples are analyzed at once, a determination being made of the amount of matter soluble in bisulphide of carbon, the percentage of matter volatile at a fixed temperature, and, in a number of cases, in each different kind of

material which was laid, the percentage of petroline and asphaltine is determined. Special note is also made of the physical characteristics of the insoluble residue, particularly of the variations in size of the particles. The remainder of the sample is filed away for future reference, the intention being to make examinations of the pavement taken from the same locality at subsequent times and see what changes shall have taken place in the material in the street which has been subjected to traffic of known density, under various degrees of temperature, humidity, etc., and in that which has been lying upon the shelves of the laboratory.

In the asphalts a determination is made of the total bituminous matter, dividing it into petroline and asphaltine, the organic matter, not bitumen, the mineral matter, the specific gravity of the asphalt, etc.

Flash and fire tests are applied to the petroleum residuum oils and their specific gravity is determined, the use of an uniform quality of residuum oil being of great importance. In case a maltha or liquid asphalt is used, as in the practice with the California asphalt, the same tests are applied, while the amount of matter soluble in bisulphide of carbon is determined, as well as the percentage of water and matter volatile at 250 degrees F.

The results thus far obtained have been interesting, and have established the reason for several phenomena which were observed, but their greatest value will not be realized until the pavements can be observed after several years of use, while a study of these analyses in connection with data as to the cost of maintenance and of the volume of traffic which the pavement has sustained should add materially to the general knowledge of the subject and aid in determining the best treatment for the different products.

It is very satisfactory to the engineer to be able to determine the actual cause of any failure or unusual condition which may be observed. Thus when in completing a contract with Alcatraz asphalt, the last 100 feet laid appeared suddenly to have lost all its cohesiveness and was not consolidated by the roller, an examination showed that the mixture contained but 4.46 per cent. of matter soluble in bisulphide of carbon, while that which had previously been laid showed 8.75 per cent. Of course the contractor lost no time in removing it, but it showed that there was carelessness somewhere. As there was no change made in the mixture, the conclusion was that the tanks were worked too low and a large amount of mineral sediment was drawn off into the cement. This might have occurred to a much less degree, so as not to have been noticeable, and yet resulted in a piece of pavement so low in bitumen as to become friable and disintegrate in a very short time.

Another case was that of a pavement which in its second summer appeared considerably softer than when first laid, certain spots of limited area being so plastic that a hole could be made entirely through the wearing surface with the heel of one's shoes, while in a few hours it would resume its normal surface. Laboratory examination of the pavement from one of these soft spots showed that in the upper surface the percentage of soluble bituminous matter was 10.74, at the bottom 15.69, while an average sample from top to binder showed 12.91 per cent., and at the bottom next to the binder were found portions of asphaltic cement entirely free from sand. This street was one of the first laid with a binder formed of asphaltic cement instead of coal tar, and the trouble was undoubtedly due to the fact that in spreading the binder course an excess of the cement accumulated at these places which in time soaked up into the wearing surface, forming a mixture too rich in bitumen to sustain ordinary street traffic in hot weather. The same trouble has occurred in pavements laid with tar binder. The necessity is thus shown of carefully removing these portions of the binder where an excess of tar or asphalt appears, and substituting the standard mixture. This will sometimes occur in the work of the most expert contractor, and the inspector should be instructed to insist upon the removal of such patches.

Reference was made above to the sizes of the particles of the mineral and other insoluble matter which form about 90 per cent. of the paving mixture. It appears to the writer very important that the sand should be so selected as to show such a graduation of sizes that the voids will be reduced to a minimum. It is well known that the very best asphalt will not resist oxidation if the pavement be porous, and the more perfectly the voids be filled the better will the pavement be able to resist the wear and tear of street traffic.

An examination of a number of paving mixtures showed the

following variations in the size of the insoluble residue, the results given being the average of the samples of each kind of pavement which were examined.

Percentage of Total Insoluble Matter Retained on Sieves of Different Mesh.

Kind of Asphalt Used.	10 Mesh.	20 Mesh.	40 Mesh.	60 Mesh.	80 Mesh.	100 Mesh.	Finer than 100
Trinidad Lake.....	4.60	13.43	27.23	24.42	9.20	1.97	19.15
Trinidad Land.....	0.07	1.11	15.30	53.87	7.42	1.14	21.09
Alcatraz.....	0.05	0.74	13.54	38.70	17.61	4.26	25.10
Bermudez.....	0.03	7.34	24.10	31.99	13.42	2.19	20.93

Of course the kind of asphalt used bore no relation to the sizes of the insoluble matter, which were governed by the quality of sand selected for the pavement, and it was given only to identify the contractors using it. It will be seen, however, that the variation is considerable, while there were marked differences in the specimens laid by the same contractor, although the sand used was supposed to be the same. The variations in the percentage of bituminous matter found in the different pavements tested are given below:

Percentage of Matter Soluble in CS₂

Kind of Asphalt Used.	Highest.	Lowest.	Average.	Range.
Trinidad Lake.....	9.95	9.31	9.655	0.64
Trinidad Land.....	10.36	9.94	10.15	0.42
Alcatraz.....	9.08	8.20	8.673	0.88
Bermudez.....	9.74	8.48	9.108	1.26

This shows that the contractors using Trinidad lake and Trinidad land asphalt were able to control their mixture somewhat better than the others.

The chief present value of these results is to enable the engineer to discover any tendency to carelessness or irregularity and put him on his guard, while it is expected that they will be extremely useful in subsequent observations of the pavements.

Specimens are being collected from the older pavements where openings are made and these will be analyzed during the winter, and general conclusions can be reached as to the changes which the material has undergone. Too much importance cannot be attached to the practice of carefully recording every incident connected with the laying of the pavement, the temperature and other conditions prevailing, the character of the foundation, etc., while records should also be preserved of the density and character of the traffic. These should all be compiled in form convenient for reference, and there is little doubt but that in many cases of short-lived and unsatisfactory pavements an intelligent examination of the laboratory and office records will disclose some sin of omission or commission to which the defect can be clearly traced.

The general methods followed in the examination of refined asphalts were those outlined by Miss L. A. Linton.

In the case of pavement mixtures, the samples, after having been pulverized in the mortar, were weighed out in a suitable flask and disintegrated with successive portions of bisulphide of carbon, the solution being each time decanted into a settling jar. This solution, freed from all sediment, is poured into a flask connected with a condenser, the solvent evaporated and the residue weighed.

When time permits, this extracted matter is further examined in the same manner as the refined asphalts, specially with a view to the determination of the petroline and asphaltine.

It is not expected to confine our work to the examination of asphalt alone, but analyses are now being made of a number of specimens of vitrified brick, a determination being made of silica, alumina, iron, lime and magnesia entering into their composition, while the specific gravity and the capacity of absorption are found. Of course, all cements used on street paving work are carefully tested in the same laboratory. This

work is simply referred to, however, as it is assumed that the physical tests, at least of brick and cement, are invariably applied. It will be found that the more interesting investigation of the materials and methods used in the laying of asphalt pavements can be made at very slight additional expense.

This brief outline of the work done and the objects sought to be attained is submitted in order to show that a simple laboratory can be established and maintained at a very slight expense, while the results obtained will tend to give the engineer far better control of the work, and enable him to avoid mistakes which will be many times as costly, and at the same time enable the municipality to profit by the competition now existing among the different asphalt companies.

TESTING PAVING BRICK.

BY A. D. THOMPSON, CITY ENGINEER, PEORIA, ILL.

The rapid increase in the use of brick for paving purposes has directed the attention of officials in charge of such work to the best methods of procuring the most durable material at a reasonable cost. Municipal officers agree that the three essential qualities to be possessed by paving brick are as follows: (1) It shall be tough, to prevent rapid wear, thus prohibiting brittleness or undue softness; (2) it shall be non-absorptive, to prevent disintegration by the weather and the absorption and retention of street fluids, which produce an unsanitary pavement; (3) it shall have sufficient strength to resist, without crushing or breaking, the heaviest loads passing over the street.

The old plan universally employed was to judge paving brick by inspection, and fully one-half the cities using brick pavements at present require brick satisfactory to the Engineer or Board of Public Works, without naming definite qualities. This is unfair to the manufacturers as well as to citizens paying heavy assessments for street improvements, and is the main reason for condemning brick pavements.

Color is used by inspectors as the main guide to judge the quality, and it is a good basis to compare bricks from a single factory, after determining by tests the color indicating the best quality; but it cannot be used in comparing the qualities of bricks manufactured at different places. The various materials used—clay, shale, fire clay, or mixtures of these; the method of manufacture, and fuel used in burning—coal, oil, or wood—all affect the appearance and color of a brick and render it impossible to use the same color as a criterion by which to judge the bricks of different manufacture. The bricks manufactured at two places in this State are made from a shale which is supposed to be the same. The black bricks from one are the best, but the same color from the other factory indicates a brick that is unfit for use. Another factory used coal as a fuel for the first portion of the present season, and the black brick, while most acceptable under this condition, were rejected when the fuel was changed to oil.

Another strong point in favor of testing brick and inserting test requirements in the specifications is, that by this means only is it possible to state the specific qualities which the material demanded must fulfill. Engineers draw up these specifications, as a rule, and the unprofessional method of requiring any material satisfactory to any man, or set of men, should be strongly condemned. It is acknowledged by engineers that the fairest competition and the best quality of materials can be obtained for all construction work by making the requirements for same specific and definite. It is only by test requirements that the qualities of a paving brick can be accurately defined. Again, a continual demand for a better quality of brick, which reliable experiments indicate can be obtained, forces the manufacturer to supply the demand by raising the standard of his product.

The points which appear to establish the necessity of testing paving brick are:

1. There is no other method of determining the quality.
2. It is the only method by which the qualities demanded can be definitely and specifically stated.
3. It is the only method of judging quality which is fair to both the manufacturer and citizens.
4. The quality of the material is continually improved.

It is claimed by many engineers that the fitness of a brick for paving purposes can only be determined by submitting it to actual wear in the street, and that no system of testing has been devised which will determine whether a brick possesses the qualities necessary for a good paving material. Even among

the men who admit the necessity and appreciate the value of tests, there is a wide difference of opinion as to those which are necessary, and the methods of conducting same.

The amount of absorption in a specified time is used by some cities as the single criterion of the quality of a brick, while among the tests required by other municipalities are those for absorption, abrasion, impact, grinding, penetration by oil, transverse strength, crushing strength, and chemical analysis. There are but three qualities to be determined, viz.: toughness, non-absorptiveness, and strength; and the three mechanical tests of abrasion, absorption, and transverse strength, show conclusively the degree in which these qualities are possessed by the specimen, thus making additional tests superfluous. The chemical analysis of brick and penetration by oil give no data as to its wearing qualities, although the first test of the clay or shale is valuable in determining its fitness for the manufacture of brick. It is not necessary to determine the crushing strength, because a brick which possesses the requisite transverse strength is sufficiently strong to resist crushing.

The quantity of water absorbed in a given time indicates the probable disintegration by freezing, and is also an indication of the completeness of vitrification. Since the material is hard and dense, the brick should be immersed for a time sufficient to permit the water to reach the centre of same; but this time should not be unnecessarily extended, as every day used in conducting tests may cause considerable loss to the contractor or manufacturer. There have not been sufficient experiments conducted to definitely establish the minimum time necessary for this test, the time usually specified varying from two hours to seven days. From experiments and observations in the past three years, the writer has found that paving brick absorb the larger part of water in forty-eight hours, after which the absorption is very slow, thus indicating that water reaches the centre of the most dense brick in the first-named time.

The brick should be thoroughly dry before immersion, which condition can be attained by drying in a gas oven. They should also be broken, or the outer coating removed in some manner, as it is non-absorptive and seriously interferes with the absorption in most cases. To determine the effect of the outside coating on ordinary paving brick which were not salt-glazed, several lots were thoroughly dried and immersed in water, without breaking them or removing the coating. The amount of absorption in forty-eight hours was noted with the brick in this condition. They were then broken in the middle and again immersed for the same period of time, with the following results:

	Per Ct. Before Breaking.	Absorption After Breaking.	Average Gain. Per ct.
Lot No. 1, average of 27 samples.....	1.49	3.72	2.23
Lot No. 2, average of 14 samples.....	5.84	6.05	0.21
Lot No. 3, average of 20 samples.....	1.38	1.70	0.32
Lot No. 4, average of 7 samples.....	3.32	3.33	0.01
Lot No. 5, average of 11 samples.....	4.59	4.67	0.08
Lot No. 6, average of 4 samples.....	5.67	6.01	0.34
Lot No. 7, average of 13 samples.....	3.59	3.38	0.29
Lot No. 8, average of 12 samples.....	5.11	5.31	0.20

Each lot of brick was obtained from a different factory.

This coating is the most impervious on the very hard-burned brick; but as the interior of these is generally non-absorptive, the effect of the coating is most noticeable on the medium-burned, with a hard coating and a softer interior, there being practically no coating on the very soft ones.

The amount of absorption allowable depends largely upon the material from which the brick is manufactured. In the winter of 1894-5 the writer conducted some experiments to determine this point, using bricks in each lot of varying degrees of hardness, from those which absorbed nothing to bricks which absorbed 10 and 12 per cent. in forty-eight hours. Lots were procured from two factories producing shale brick. After immersion in water for forty-eight hours they were placed in a brewery brine tank until thoroughly frozen. They were then thawed, dried, and weighed, and this process repeated fourteen times. The tests were stopped at this point by an inquisitive genius, who obtained access to the laboratory and broke large pieces from all the bricks in sight, to examine the interior. These experiments, however, indicated that with shale brick an absorption of from 5 to 6 per cent. in forty-eight hours could be allowed, with no resulting harmful effects from the frost; and, considering the absorption test merely as an indication of the action of the frost, the requirements of the

different municipalities are generally too severe. This conclusion was corroborated the next winter, when the same experiments were conducted upon lots from seven factories. In this case the bricks were immersed in a shallow pan of water and frozen five times by exposing them to the weather.

But this test is of more value as an indication of the vitrification, or the point just previous thereto, which is an absolute requirement for good paving brick. This quality is shown by no other test thus far devised, and a brick which absorbs more than 2 to 2 1-2 per cent. of water in forty-eight hours lacks this element to such an extent that it will not produce the best results in a pavement.

The transverse test gives the strength of the brick when used as a beam, with the load applied at the middle, and is valuable in determining brittleness and showing laminations. A high transverse strength is also an assurance of high crushing strength. For these reasons this test is of more value than is generally accorded it. It is made by supporting the bricks at the ends upon knife edges and breaking same by pressure applied by knife edge at the middle, with bricks laid flat. The strength per square inch of section is then figured by the beam formula: $R = (3/4 \cdot 2bd^2) w$, where R = modulus of rupture per square inch, l = length in inches between supports, b = breadth in inches, d = depth in inches, and w = loads in pounds. The highest modulus required three years since was 1,600 pounds, but this requirement has steadily increased until the past season the writer has required a modulus of 2,200 pounds, and has obtained extremes of 5,800 and 6,000 pounds, while moduli of 3,800 and 4,000 pounds have not been uncommon. These results were obtained without grinding the surfaces to parallel planes, or placing on them anything to equalize the pressure.

The toughness is generally determined by the abrasion test, which generally consists in tumbling a number of bricks in a foundry rattler for a certain length of time, together with given quantities of scrap iron, or other substances of various sizes and weights. This treatment is intended to produce the same effect upon a brick as the blows of horses' shoes, which is the main cause of wearing on brick pavements, and it is preferred to the grinding test because it is less difficult to conduct and more nearly represents the actual wear on the street. A test conducted in this manner is the best that has been devised for such a purpose, but it is far from satisfactory, because of the uncertainties attending the results obtained at different places. The size, shape, and speed of the rattler; the size, quantity, kind, and weight of the scrap iron or other material used, and the number of bricks tested at one time, are all factors determining the toughness of a brick which vary with every engineer. The rattler should be of sufficient size to tumble the bricks and allow a reasonable fall of same. Experiments conducted by Prof. A. N. Talbot, at the University of Illinois, and Mr. H. J. Burt, to determine the effect of size of rattler upon the abrasion test, tend to show that, "for lengths sufficient to prevent the wedging of bricks at the end—say twenty inches—there is no great variation in results, the relative number of brick and proportion of volume of rattler filled remaining the same." Also that "a rattler 24 inches in diameter gives greater wear than one of small dimensions, and that there is probably little difference between one 24 inches and one 30 inches in diameter."

Prof. Orton, of the Ohio State University, in reporting the results of tests to the National Brick Manufacturers' Association, conducted to determine the effect of length and diameter of rattler, says: "The length of the cylinder was varied from 12 inches up to 48 inches by the use of my movable diaphragm. The shortest cylinder, 12x28, say, gave less regular results than those which were longer, because of the tendency of the brick to wedge endwise. But from 18 inches up to 48 inches in length (the diameter being always constant) the wear was substantially uniform for all sizes, showing that if the percentage of volume of the charge and the time and the speed be maintained equal, length cuts no figure." As the results of his experiments to determine the diameter producing the greatest abrasion, Prof. Orton concluded that, all other conditions remaining uniform, the loss varies directly as the diameter up to a certain point, and that above a diameter of 28 inches there is no increase in rate of loss.

The abrasion is also affected by the shape of the rattler, which is generally circular or hexagonal. The interior of the circular iron rattler is soon worn so smooth that, instead of tumbling, the bricks merely slide around, and it is best to

fasten three or four narrow wrought-iron strips on the inside to prevent such action. The abrasion is less in wooden rattlers than in cast iron, because the wood acts as a cushion in breaking the fall of the brick.

The amount of abrasion with a given number of revolutions depends to a great extent upon the rapidity of same. If the rattler be revolved at a very high or very low speed, the effect produced upon the samples is slight.

Experiments conducted by the writer, and corroborated by results obtained by Prof. Talbot, indicate that the maximum loss appears to be obtained at a speed between 20 and 30 revolutions per minute.

Scrap iron is generally used for the abrading material, because of its cheapness, but the size, kind, and quantity to be placed in the rattler varies widely. The size should be such that not only a grinding effect is produced, but the bricks should receive blows at each revolution which will be similar to the blows received in the pavement. Many engineers advocate using foundry shot or stars, which produce a grinding effect only; but the main objection to the use of small pieces alone is that the brittleness of a brick is not discovered. The abrasion test, using foundry shot for the abrading material, is no measure of the toughness, as brittle bricks under such conditions give the highest results, unless this fault is shown by the pounding of the other samples. Brittleness is the most serious fault of paving brick to-day, and it must be overcome before brick can compete with other paving materials for streets of heavy traffic.

The grinding and pounding effect can both be obtained by using scrap iron of various weights, say from one-fourth of a pound to five pounds, with a certain per cent. of pieces of intermediate weight. Pieces larger than about five pounds in weight break many of the bricks. In order to make the tests uniform the scrap iron should be revolved until the sharp edges are worn off, and the same point observed as new iron is added. The quantity of scrap iron that should be used and the number of brick tested at one time depend upon the size of the rattler. There should be sufficient scrap iron to fill the rattler the full length for a depth equal to about one-sixth its diameter.

The size of the rattler and quantity of abrading material used determines the number of bricks it is best to test at one time. A sufficient number should be placed in the rattler to eliminate accidental loss, as nearly as possible, but it must be borne in mind that too great a number will cause a large breakage of the samples. With a rattler two feet in diameter and three feet long, with 300 pounds of scrap iron, the writer has found twelve bricks a good number. The number it is safe to use can readily be determined in each case by a few experiments, maintaining the same conditions and noting the effect of varying numbers of samples.

The experiments conducted by Mr. H. J. Burt and Prof. Talbot, previously referred to, give some interesting data regarding the size and amount of scrap iron producing the greatest abrasion. Regarding these tests Prof. Talbot in a personal letter says:

"The tests were made with shot of two different sizes, the larger size 2 1-2 inches by 3 1-8 inches by 5 1-4 inches, with corners rounded with 1-2-inch radius and weighing about eight pounds each; and the smaller size 1 inch by 1 1-2 inches by 2 1-2 inches, with rounded corners, weighing about one pound each. In some of the experiments ordinary foundry shot was also used. With one-pound shot charges of 100 pounds to 400 pounds gave nearly equal losses, while 200 pounds gave a greater loss. With eight-pound shot, the larger the charge the greater the loss, 400 pounds being the greatest amount used. With a mixture of 100 pounds of one-pound and 200 pounds of eight-pound shot, the loss was 40 per cent. greater than with 200 pounds of one-pound and 100 pounds of eight-pound shot. The action in the two cases is quite different. With eight-pound shot there is considerable spalling and chipping, while with the one-pound shot the abrasive action was the principal one.

"The use of brick alone, without foundry shot, which has been recommended by some experimenters, was not considered desirable, because the loss varied so much with charges composed of different numbers of the same kind of brick, and the size of the brick also had an unknown effect; and likewise there was some chance of accidental and unusual loss to individual bricks. To avoid these, it seemed to me necessary to use as many as twenty-four bricks, a very cumbersome test."

This test should be conducted a sufficient time to produce an appreciable loss and develop the faults of the bricks. The duration of the test should be governed by the amount of iron used in the rattler and the number of revolutions per minute. During the season of 1894 the following tests were made by the writer to determine the limit of time for the abrasion test. Bricks of different manufacturers were obtained, and each lot was revolved for four consecutive hours, the loss being noted at the end of each hour and expressed in terms of the weight at the beginning of each hour, all conditions of the test remaining the same for each lot. The following results were obtained, which are the averages:

Lot.	PER CENT. LOSS.				Total.
	First Hour.	Second Hour.	Third Hour.	Fourth Hour.	
1.....	8.35	6.79	5.47	3.99	21.4
2.....	11.44	6.81	3.55	3.04	22.3
3.....	11.07	5.09	4.40	3.43	22.5
4.....	9.28	5.09	3.31	2.11	18.2
5.....	12.59	6.67	6.21	4.12	26.4
6.....	9.40	4.00	4.08	3.61	19.7
7.....	9.45	4.52	4.59	3.14	20.0
8.....	7.92	4.74	3.59	2.24	17.4
9.....	6.59	2.32	2.54	2.00	12.9
10.....	11.16	5.55	4.00	2.97	21.8
11.....	7.11	4.07	3.79	2.58	16.75
12.....	7.99	4.81	3.17	2.64	17.62
13.....	6.52	4.07	4.66	4.33	18.29

These experiments showed that under the conditions imposed, one hour produced an appreciable loss upon the best paving bricks, and that the loss gradually decreased. For this reason one hour was adopted as the limit for the abrasion test. The conditions under which the tests were conducted are as follows:

Circular cast-iron rattler two feet in diameter, three feet long, and containing 200 pounds of scrap iron, weighing from one-fourth of a pound to five pounds. The rattler was revolved at the rate of fifteen revolutions per minute for one hour; shaft does not extend through rattler; not more than twelve bricks, 2 1-2x4x8 inches in size being tested at one time.

The abrasion test has since been conducted in the same manner, except that during last season four wrought-iron strips one inch by one-half inch, equally spaced, were bolted to the inside of rattler to prevent sliding, and the amount of each size of scrap iron has been used in the following proportions:

Fifty pounds of each of the following weights:

1-4 pound to 1-2 pound.			
1-2	"	1	"
1	"	2	"
2	"	3	"
3	"	4	"
4	"	5	"

The custom of comparing the loss by abrasion with the loss of some other substance subjected to the same treatment gives unreliable results. The substances generally chosen are cast iron or granite, of the same size as the bricks. The comparison with Quincy granite, as proposed by Prof. Baker, of the University of Illinois, appears to be especially faulty.

In the first abrasion tests conducted, the writer attempted to compare the loss of the bricks with that of Quincy granite cubes subjected to the same treatment. For this purpose granite cubes were procured from Vermont, and were received with rough edges. No marble yard in the city could dress them, and the experiments were conducted with the cubes in that condition. These experiments soon developed the fact that the cubes varied in hardness, and the loss of the lot was not regular, being much less after the rough edges were worn off. The plan was then adopted of obtaining the loss in per cent. of the original weight, and this method has been perfectly satisfactory.

The lack of uniformity in the requirements by different municipalities of the kind of tests, manner of conducting same, and results desired, has caused much dissatisfaction among engineers and manufacturers, and has made brick tests of no value except for local comparative purposes. Engineers, municipal officers, manufacturers, and citizens will not place confidence in such results until a standard of the tests required and manner of conducting same is adopted by the several cities interested.

EXCAVATIONS IN CITY STREETS.

BY GEORGE D. SNYDER, CITY ENGINEER, WILLIAMSPORT, PA.

No more difficult problem has to be solved by the city officials than the adoption of satisfactory regulations relating to excavations in public streets and the tearing up and relaying of pavements caused thereby. There is nothing more aggravating, both to the general public and to the city official, than to see a street that has but recently been paved torn up to gain access to the underground pipes and conduits, and the pavement but indifferently replaced. The city official feels that all his care and attention to the preparation of specifications, the testing and selection of material, and to the execution of the work in its most minute details has been so much time wasted. The general public feel that they are not getting the worth of their money, as they have paid for and received a smooth and durable pavement, but see little prospect of it remaining such.

There are about as many different regulations relating to this subject as there are cities. In some the persons digging up the streets are under practically no restrictions at all, while in others the regulations are so strict as to make their enforcement to the letter practically impossible. In some places persons desiring to dig up the streets are required to give a bond to restore the pavement to its original condition and maintain it so for a specified time. In others they make a deposit of a sum of money to cover the cost of replacing the pavement, while in others a certain fixed sum per square yard for excavating the different kinds of pavement is paid. The practice of requiring a deposit of a sum of money greater than any possible expense to which the city can be put in replacing the pavement is perhaps the best, as the exact number of yards to be torn up cannot generally be determined beforehand, and to collect money on a bond is not always easy.

Some cities, after paving a street, will not allow it to be torn up for any purpose during a fixed term, such as two or three years. Such a regulation, however admirable it may be in its purpose, seems impossible to carry out on account of the difficulty of ascertaining all the necessary repairs to underground pipes before the pavement is laid, and from the fact that no man can tell when a serious leak in a gas or water main, or obstruction or break in a sewer, may make the tearing up of the street imperative.

The writer will briefly give the practice in his own city in regard to tearing up and replacing pavements, not because he believes it cannot be improved upon, but in order to bring the matter before you in the hope that it will be thoroughly discussed and the good points in the practice of other cities brought out.

In the city of Williamsport, when an ordinance for the paving of a street has been passed, the City Engineer notifies all corporations having pipes in the streets to make all necessary repairs or renewals to the same. He also notifies all abutting property owners to make all necessary gas, water, steam, sewer or other connections before a certain date, when the street is turned over to the contractor and after which no permits are issued for such work. In default of the property owner making these connections they are made by the city at his expense. At the same time the city completes the sewer system under the area to be paved, building sections of sewers across the street wherever necessary for future extensions. In carrying out the above provisions an effort is made to anticipate as much as possible all new underground work that will be necessary during the life of the pavement, so that all future excavations will be limited to absolutely necessary repairs.

Try as you will to avoid it, it becomes necessary at times to excavate in the paved streets, and our city has provided that such work be done as follows: When individuals or corporations desire to make excavations in the public streets they must apply to the City Engineer for a permit; the City Engineer makes an estimate of the cost of replacing the pavement and maintaining it for one year; upon the payment of this amount the permit is granted, provided that the object for which the excavation is made is a legitimate one. Any corporation wishing to extend their pipes or conduits on any street must file a plan showing the proposed location with the City Engineer for his approval. If this location interferes with the line of a contemplated sewer or other city work, it must be changed. The trench is refilled by the person taking out the permit, and the street surface is restored by the city. All pavements that have been guaranteed for a term of years are

replaced by the contractor who constructed them. When a contractor bids for the construction of a pavement that is to be guaranteed for a term of years, he also names a price per square yard for which he will repair all openings made in the pavement during the term of his guarantee. The object of this provision is to prevent the contractor from attributing the condition of the street at the end of his guarantee to the defective manner in which openings have been repaired. A permit for excavating such a pavement is charged for according to the number of square yards to be opened at the rate bid per square yard.

Pavements not under a guarantee are all replaced by city employees. The city has prescribed the manner in which refilling shall be done, and provided a penalty for nonconformance therewith, but this is very difficult to enforce, and some careless refilling is done. The remedy for this would be to either have the ditches refilled by the city force or under city inspection, but as the law does not provide for this at present, we have endeavored to replace the pavements in a durable manner in spite of more or less indifferent refilling.

We have accomplished this, as a rule, by the use of concrete foundations. Concrete, as a pavement foundation, has many advantages. It can be readily laid in small patches, and can be made to join on to most any kind of foundation. One of its great advantages is that it prevents any water finding its way into the trench from the surface. No matter how carefully a trench is refilled, if water finds its way to it it will settle. We have therefore used concrete to replace broken stone foundations of brick pavements and to replace the Telford base of broken stone pavements. Where foundations are replaced by concrete, the pavement is removed to a greater width than that of the trench, so as to give a shoulder of firm ground for the concrete to rest on, in case the trench should settle, the concrete forming a bridge to support the pavement. Concrete is thus used for repairing all pavements excepting wooden block. As the few remaining pavements of this kind that we have are rapidly being replaced with those of a more permanent character, it has not been thought worth while to repair them with anything but a plank foundation, such as they originally had.

On the unimproved streets the trenches are refilled with a slight crown above the general level of the street and left to settle. Should the trench settle below the level of the street, it is filled up with broken stone or gravel.

The charges made for excavating permits are about as follows:

	Per Square Yard.
Asphalt.....	\$3.30
Brick.....	3.00
Broken stone.....	1.50
Chestnut block.....	.50
Unimproved streets.....	.25

In winter openings have to be repaired temporarily until the weather will admit of permanent repairs, and an additional charge is made.

The proper manner of refilling trenches is a subject upon which there is much difference of opinion. A great deal has been written as to the relative advantages of tamping and puddling. It seems, however, to be a subject upon which no general rules can be laid down. It is hardly wise to speak of gravel, sand, clay, loam, etc., and to say that certain of these materials should be puddled and others of them tamped, when materials bearing these names have such totally different characteristics in different sections of the country, or even in different sections of the same town, as to require totally different treatment.

The assertion has been made that the proper solution of the problem is to replace, by whatever means, all the material taken out of the trench, allowing for the displacement of the pipe, or whatever is buried therein. Yet I have no doubt that many of you have seen all the material, and more, too, in addition to a pipe, replaced in an excavation, and yet a settlement would occur. On the other hand, with some materials it seems physically impossible to replace anything like all the material, and yet such a trench often does not settle.

One of the solutions of this problem that has been suggested was to refill all trenches with sand. This seems to be a needlessly severe requirement to lay down as a general rule, although with some unstable materials it might be highly necessary to use sand, or even gravel or broken stone.

The problem is complicated in some instances by the contractor guaranteeing and maintaining the pavement for a term of years, and in others by a street railway company having to maintain the pavement. While corporations owning pipes in the streets should not be allowed to damage pavements without duly compensating a city for them, these corporations supply the citizens with some necessity, such as light, water, or heat, which nearly every citizen must have. It must not be forgotten that any undue restriction on such a corporation must eventually be paid for by the property owner. With all these conflicting interests the problem becomes a different one in every city, and must be worked out by each for itself.

What would undoubtedly be the best and cheapest treatment of this problem in the long run would be to construct conduits of sufficient size to contain all pipes and electric wires as well, and admit of access to them. If our cities were built all at once it would certainly be the thing to do, but nearly all cities counting on future growth have such a large allowance of sparsely settled territory that the cost at first would be prohibitory, and when the city is sufficiently settled to warrant such an expenditure, the cost and inconvenience of changing and abandoning existing conduits owned by diverse interests prevents such projects from being carried out.

In describing the practice of repairing streets in Williamsport I have stated what we try to do and not what we always accomplish, for nothing is more difficult than to have work done, in small patches, equal to that of the original street; and if we wish to maintain the uniform surface of our streets we must pay, as for liberty, with eternal vigilance.

PAVING STREETS WITH BRICK.

BY S. J. HATHAWAY, CHAIRMAN OF STREET COMMITTEE,
MARIETTA, O.

The streets of Marietta are quite wide, most of them being eighty-three feet wide. Two are 115 feet and one 150 feet in width. This last was named for Gen. Washington by the early settlers, many of whom had served in the Continental army, and so named the broadest street for Washington. The Ohio company which founded Marietta was formed in Boston at the Bunch of Grapes tavern, March 1, 1786, and, having the narrow streets and cow paths of Boston before them as object lessons, they resolved that the new city they were about to found at the mouth of the Muskingum should have amply wide streets. We have good wide streets, but it costs a great deal to improve them, owing to their extra width, yet we are thanking those wise associates of the Ohio company more and more as time goes on for giving us such broad thoroughfares. "They builded better than they knew."

On the main business streets we pave fifty feet in width; on other streets forty feet. One street has been paved twenty-four feet in width, but there has been complaint about it being so narrow. Teams cannot turn round easily on such a narrow pavement.

The contractor excavates one foot in depth the full width. The sub-grade is then rolled with a heavy road roller. Our specifications call for a seven-ton roller, but on Third street—the one now under contract—we are using a thirteen-ton roller, thereby securing a much better foundation. After the steam roller gets through with a square, the bicycle riders can ride over the grade with as much ease as they can over a paved sidewalk. After the sub-grade is rolled six inches of gravel is put on, then rolled with a seven-ton roller, the steam roller being too heavy for rolling gravel. Then two inches of sharp sand is put on to lay the brick in; thus, six inches of gravel, two inches of sand, and four inches of brick, making in all twelve inches. This fills the excavation back to the established grade. Then one inch of sand is spread on the top and broomed in and the brick are rolled with a seven-ton roller. After that one inch of sand is spread over the surface and the pavement is finished.

We use Berea curb, five inches thick, eighteen to

twenty inches wide, with none of the pieces less than four feet long.

The crown of the pavement is usually even with the top of the curb, with six inches depth of gutter. The height of the centre is generally equal to height of curb.

The engineer always runs in two lines, one for each curb, as sometimes the curbs will vary a little in height to accommodate varying conditions on the sides.

The curb is set in a sand cushion two inches deep and is backed by two inches of sand thoroughly tamped. We have never had any trouble from frost, and we have not found a better stone to wear than Berea, but any hard stone will do just as well if it can be got out in proper lengths.

The two principal points, of course, in a brick street pavement are, first, the foundation; second, quality of brick.

Many different kinds of brick are offered. Two kinds, however, present marked differences—shale and fire-clay. Both of these kinds are known to the trade in two general divisions—standard brick and repressed brick or block. A repressed paving brick is generally larger than a common or standard brick, and is called a block. It makes little difference, in my estimation, which you use, provided they are equally well burned. One-third fire-clay and two-thirds shale makes a fine, hard brick. There may be other combinations, but I am only familiar with this one. We have more streets paved with this than any other kind. We also have several streets paved with Hallwood block, which are giving excellent satisfaction. One street subject to heavy traffic was paved with this block three years ago, and you can scarcely find a block which shows signs of wear so far.

On the whole, I am in favor of a repressed shale block, and believe if it had one-third fire-clay it would be an advantage. I live in a shale country, and think if properly burned there can be no better paving material produced from clay. If they are burned hard enough and then cooled properly—or, rather, to use a more scientific term, properly annealed, as they should be—a brick can be produced which will last nearly as long as a granite block. The advantage of repressing is that it makes a solid, compact mass, which is more likely to burn hard than the ordinary product of the "pug mill." The advantage of bevelling the edges is that it gives the horses a better foothold. The common paving brick has sharp edges, which are bound to be broken off, so that in the course of a few years the edges present the appearance of having been roughly bevelled. The repressed block presents smooth, bevelled edges, impervious to water, while the raw edges of the ordinary brick, broken off by travel, are more likely to absorb water; but the whole question of absorption of water does not cut much of a figure if the material has been properly burned. I have the first case yet to see of water getting under the pavement and causing the frost to displace the brick.

Paving thoroughfares with brick is by no means a modern invention. There are country roads in Belgium that have been paved with brick over a hundred years.

The question of durability is largely one of skill in burning the brick properly. A perfectly annealed brick, like a fine tempered piece of steel, will outlast the man who made it. I would place the life of a well-made brick pavement on a residence street in any ordinary sized city at a hundred years. Indeed, it is purely problematical how long such a pavement will last. It might not last forever, but seems to a finite understanding almost indestructible.

We have never used tar to fill in between the brick, deeming it unnecessary. It costs considerably more to do it, and in case you have to open the pavement the brick are so firmly stuck together that they have to be thrown away. Six months of a pavement will fill the in-

terstices, if any should remain unfilled with sand, as firmly as need be. We can take up our street pavement at any point and find the sand underneath dry, showing that the pavement is impervious to water.

An important question is the cost of brick paving. Many cities before they come to the period of brick paving try various expedients by treating the streets with gravel, slag, or macadam in the vain endeavor to make a satisfactory street at small cost, and nearly if not quite enough money is thus spent in these more or less fruitless endeavors to pay for a good brick pavement. "You pays your money and you takes your choice"—granite block, Belgian block, cedar block, asphalt, or brick; but all things considered, brick is the cheapest and the best for ordinary traffic.

I am sure the ease with which a wheel passes over a brick pavement is a great advantage compared with any kind of a stone pavement, and it is a more sanitary pavement, for granite, Belgian, or cedar block catch a great deal of refuse matter, which is bound to be left to fester in the sun and cast its mal-odor into places of business or residences and taint the atmosphere of the street, with more or less danger to health. Besides that, the ease with which a brick pavement can be repaired is a great advantage. Every brick is from the same mould, and always ready at hand to repair a break.

Again, the thorough manner in which a street sweeper will clean a brick pavement recommends it over all others unless it be asphalt, but it must be remembered that asphalt costs nearly twice as much as brick, and therefore ought to be superior in many ways to brick.

For heavy traffic I would recommend broken stone and concrete foundation, but for residence streets sand and gravel is good enough. To the average citizen, however, the question of cost is decisive as to material, and it turns out that brick is the favorite.

Our first improvement, begun in 1891, was of standard brick and cost \$1.08 per square yard of finished pavement; Berea curb, 35 cents per lineal foot, laid in place. The next year we tried repressed block at a cost of \$1.14 per square yard. Our last letting this summer was at 65 cents per square yard for standard brick, one-third fire-clay and two-thirds shale, and 33 cents for Berea curb. We also paid \$400 extra for the use of a steam roller, and consider it a good investment.

Since the advent of the bicycle we have had everywhere a revival of the good roads idea, thanks to the energy and enthusiasm of the bicycle clubs throughout the country. The bicycle has come to stay, and so has the determination to build good roads come to stay. It will not down until all the main country thoroughfares are properly graded and paved. I believe it is possible to pave the country roads with brick. Let the paved roadway be sixteen feet wide, or even less, crowned slightly in the centre, with curb of rough stone, set down even with the surface on each side, so that in dry weather teams could take the dirt road on the side, if desirable. Some equitable arrangement could be made between state, county, and land owners, and thus make the cost to property owners as light as possible. The property on either side of such roads would be greatly enhanced in value, and the isolation of country life be reduced to a minimum. With such roads the farmer living fifteen or twenty miles from the city market could drive at a fast gait with loaded wagon, deliver his produce in town and get back home in time for supper, and do it with very little effort either on his part or that of his team.

Some one has said that the condition of the roads of a country are evidences of its progress in civilization. The same might be said of the bath room. But many communities might be willing but not have the power to construct proper roadways or bath rooms. Good roads and handy materials go together the same as bath rooms and

water-works. First, then, well-paved streets are indices of a higher civilization; second, they are evidences of prosperity; third, they promote prosperity; fourth, they add to the abutting property all they cost, and in most cases more.

It is claimed that there is but one finished country in the world, and that is England, with her fine roads and well-paved streets, with her superb landscapes, containing forest and field duly regulated and cared for; but England's perfection is the growth of centuries. We cannot hope for a finished municipality or country-side. We are too young to realize that yet; but each set of officials must act their part faithfully and carry forward all public works that fall to their lot with a view to ultimate perfection, and to supply the demands of the future as well as the present, trusting that in coming years both city and country will arrive at a stage of completeness, and then we shall have the best land for habitation in the world.

REPAIRS OF ASPHALT PAVEMENTS.

BY E. B. GUTHRIE, CHIEF ENGINEER OF BUFFALO, N. Y.

Any kind of pavement, when poorly laid, will give its best results when laid on a foundation well drained, compacted and free from underground work. But in a growing city of today the latter presents the most serious problem in maintenance of pavements, by reason of the many trenches for sewers, water pipes and electric conduits of all kinds, whether made by the municipality, the corporation or the individual. Whether these trenches have preceded or succeeded the pavement the evil results are the same, unless great care—and more than is ordinarily bestowed upon them—is given to solidly replacing the earth to prevent settlement. With asphalt, on account of its smooth, flat surface, the results of settlement are much more apparent to the eye than in other classes of pavement, and for this reason we probably are inclined to keep it in a higher state of repair.

From my own experience the conclusion is inevitable that the bulk of asphalt repairs is attributable to settlement over trenches, some to the effect of water getting beneath the roadway and some to errors in surface mixture, which occurred earlier in the experimental period. Classification of repairs might be made as follows, in the order of their magnitude:

- First.—Improper trenching.
- Second.—Poor material and workmanship.
- Third.—Traffic.

Repairs may be classified as follows:

- First.—Settlement.
- Second.—Rolls.
- Third.—Disintegration, where the surface separates into "macaroons" or "nodules."
- Fourth.—Cracks.
- Fifth.—Gutter painting.
- Sixth.—Defects along street railway tracks.

The repairs due to settlement over trenches have been referred to as comprising the majority of all, and covers work done by the various plumbers, corporations, contractors and the city itself. If the defect appears within the period for which the individual or corporation is responsible for its maintenance, they are required to remedy it, otherwise the burden falls upon the city. These repairs are made as occasion requires, to the entire pavement, including concrete, or binder and surface, or surface only.

Rolls or ridges sometimes two or three inches high, and extending frequently from curb to curb, are due, no doubt, to the expansion of the concrete base, though it was a long time before I believed this was the cause. These

are sometimes repaired by cutting out the entire pavement and replacing the concrete, which is made of natural cement, by broken stone, and resurfacing; at others by resurfacing only, though I believe the first is the best method, as the roll otherwise is liable to re-occur. We have this year endeavored to avoid this defect by leaving expansion joints in the concrete, extending from curb to curb, and 300 to 500 feet apart, the joints being simply spaces in concrete, in which are placed tar paper, gravel or stone.

Waviness of surface occurs from its movement on concrete by the action of traffic, and where it exists is greatest on that side of the street having the heaviest traffic. This was more frequent before the binder coat of gravel or fine broken stone and asphaltic cement was used. By borings made this season through the asphalt, at some places where this irregularity appeared, the cause was very apparent from the thin coat at the low points and the thick one at the high points.

Disintegration.—The breaking up of the surface into small, rounded pieces often occurs through the action of water which has found its way underneath, coming either from adjoining higher land or from the surface through defective places, especially if there is a railroad track in the street. Repair of this class of defect is made in both ways, cutting out down to the base, or simply renewing the top surface, the cementing properties of the asphalt having been destroyed, whatever the cause may be. When repair is made of the surface only the balance of the coating has little more effect than so much sand well compacted, and it is a question if repairs should be made in this way, except on very small patches.

From an examination of streets in 1891, the guarantees of which had almost expired, I made notation of defects, plotted these, and also the location of sewer, water and gas mains, with the result that most of the defects followed the lines of said mains and their connections. In addition the defects arising from water action generally occurred in places where the soil was clayey, and especially where the abutting land was higher. Since that date we have, where deemed necessary, placed drain tile back of and below the curb to carry off the sub-soil water, and with good results.

Cracks.—This class of defects arise, no doubt, mainly from mixtures unsuited to the climate, lacking bitumen and being too brittle, repairs to which are made by running in asphaltic cement.

Repairs Along Street Railway Tracks.—The railway company by its franchise is required to repair between its tracks and rails and two feet outside of the rails, though it claims by legislative enactment it was exempted from the latter requirement on our principal business street. Repairs have been made by the city on this street this season which the railway company failed to attend to after notification, and assessment will be levied on the company for the same, with what result is yet to be seen.

The injury to this class of pavement by the street railway company's tracks, when not properly laid with tight joints and admitting water, will extend in many cases to more surface than on any other pavement and far beyond the two feet specified above.

While on the subject I might say I believe the best results will be obtained with a heavy girder rail, rigidly fastened and with longer, heavier connections at switches and turnouts, with concrete under the rails, but not necessarily under the tie, using headers of stone or scoria block, as in Toronto, alternately long and short; if used as stretchers poor results will follow. If the asphalt is carried plumb up to the rail it is impossible to prevent a continuous joint, which will prove injurious. Generally the defects along tracks, laid as they have been in Buffalo, consist of settlement of the rail, leaving the asphalt

slightly higher, which then is gradually crumbled off by the traffic; if laid with stone next the rail, but not laid "toothing," a rut is formed between the stone and asphalt to the latter's injury, and if laid "toothing" when the company makes repairs the stones are removed, and with them comes off some of the asphalt. If done without supervision on the part of the city the chances are it will be laid back by cutting a straight joint, filling the space with stone, and this in time is followed by the rut before referred to. This, and the subject of settlement, all point to the conclusion that no individuals or companies should be allowed to disturb the pavement in a municipality except upon special permit for each and every occasion any work is done to disturb it, and, further, in my judgment, that the repairs to a pavement required by such work should be done by the municipal authorities and paid for by the individual or corporation.

Gutter Painting.—The gutters are the weakest part of an asphalt pavement on account of the action of water, and extensive repairs are made, either by cutting out the asphalt when deteriorated to the extent warranting this, or by smoothing the surface and covering anew with asphalt richer in bitumen than the remainder of the surface. I am of the opinion that gutters and curbs made of concrete would be an improvement on those ordinarily made, and I hope to learn from other cities their experience with this class of gutters.

Repairs have been made in Buffalo by contracts, each covering a period of one year, those of the current year being upon specification. It is essential that repairs be made soon after a defect appears to prevent its increase. When binder is used the stone forming the same and the surface of concrete should be clean and free from moisture, and in cuts all edges should be well covered with asphaltic cement to insure a perfect joint, and the material thoroughly rolled, being left slightly full that a depression may not result. It is our practice to locate and plot all repairs to avoid overlapping, and see that none are paid for which the contractor is obligated to maintain under the three years' guarantee. Though this is quite a complex system, there is no other way to locate responsibility, unless a contract is made based on a certain price per square yard of all under city maintenance, or for the city to have its own repair plant, which latter course will probably be the result in cities having large areas of this class of pavement.

The greater proportion of repairs are made by the "skimming" process, in which is used either a heater such as the "Perkins," having a tank of fuel oil and hooded burners, or an open grate on low wheels, in which coke is burned, heating the surface so that it can be raked off, smoothed down if too high, and filled up if too low, in each case with the addition of some new material. It has been the custom to permit the use of old material for repairs, the same being heated, new asphalt added thereto, provided the old material has not been injured by heat, though it is questionable whether or not new material should not be required.

The first asphalt pavement laid in Buffalo, other than a small experimental piece at a street intersection, was on Delaware avenue, in 1878, for a distance of 1,990 feet and covering 9,286 square yards. This was laid by the Columbus Paving Company under the management of Mr. N. B. Abbott. It had a broken stone base eight inches thick, covered with coal tar pitch, upon which was a binder course 3 inches thick, of sand gravel and coal tar pitch, then a 2-inch surface of Trinidad asphalt, sand and wax tailings. This street was resurfaced before the expiration of the guarantee, was repaired by the property-owners about 1890, and was resurfaced in 1892.

Franklin street was laid in 1879 by the Buffalo-Abbott Paving Company for a distance of about 2,043 feet, cover-

ing 7,264 square yards, and similar in character to the preceding, except that the stone base was six inches thick, and coarser sand and limestone was used in the surface. This street, in the eleven years of city maintenance, has been repaired to the extent of \$2,827.82, equal to \$.035 per square yard per annum, and in a year or two will probably require resurfacing. It has been subjected to a large amount of light traffic, and, being an old residential street, has not been torn up so much for underground work as many others, and presents the best example of a street worn mainly by traffic.

The growth of this class of pavements in Buffalo has been such that there were on January 1, 1896, the following quantities and repairs for 1895 and the eleven years of city maintenance, 1885 to 1895, inclusive, were made to the extent shown:

REPAIRS.

	Total Cost of.	Maintained by City, Sq. Yds.	Cost per Yd.	On Streets Repaired, Sq. Yds.	Cost per Yd.	Actually Repaired Sq. Yds.	Cost per Yd.
1895	\$69,661.49	1,042,543	.067	795,313	.087	57,068	1.22
1885 to 1895 inclusive.	184,349.09	*3,339,558	.055	*2,325,239	.079	134,327	1.37

*These are in equivalent yards per annum.

REPAIRS 1885-1895, INCLUSIVE.

At Periods 1 to 11 Years After Expiration of Guarantee.

Period.	No. of Streets.		On Streets Repaired.		On Total Maintenance.	
	Paved.	Repaired	Sq. Yards.	Cost, per Yd.	Square Yards.	Cost per Yd.
1 Year.	132	44	528,923	.035	1,057,025	.018
2 Years.	92	56	587,267	.086	807,692	.062
3 "	73	56	503,730	.085	606,024	.071
4 "	51	37	329,218	.136	408,550	.108
5 "	24	17	145,591	.114	200,179	.083
6 "	9	6	54,400	.063	89,761	.088
7 "	9	8	88,779	.057	89,761	.056
8 "	6	5	44,660	.034	53,946	.028
9 "	3	2	16,140	.019	28,445	.011
10 "	2	2	10,283	.061	10,283	.061
11 "	1	1	7,264	.046	7,264	.046
Average per yard per annum.....				.079	.....	.055

January 1, 1896.—

Miles of asphalt, exclusive of parkways	192.9
Total yards laid	3,581,238
Total squares laid under guarantee	2,123,168
Total yards maintained by city	1,384,418
Total square yards maintained by street railroad	73,652
Total first cost of pavement	\$10,636,157.92

Construction, 1896, to October 1.—

Miles	5.22
Square yards.	89,163
Cost	\$261,360

Prices paid for repairing asphalt pavements:

	1891.	1892.	1893.	1894.	1895.	1896.
Resurfacing, per square yard.....	1.29	1.62	1.59	1.54	1.49	1.35
Skimming.....	.....	.....	.....	.....	.99	.88
Replacing base and surface.....	2.35	2.47	2.44	2.39	2.37	2.25
Scraping joints and painting gutters, per lin. foot.....	.04	.04	.04	.04	.04	.03½
Cleaning and pouring cracks per lin. foot..	.....	.02	.02	.02	.02	.02
Replacing stone tooth-ing along street rail-way tracks, per lin. foot.....	.....	.....	.....	.....	.19	.17

While the streets have been under the charge of contractors, the guarantee having been uniformly five years,

except on streets paved in 1884, where it was extended to eight years, repairs have mainly been attended to where and to such extent as they were found necessary without necessity of demand from authorities. This is not the proper way, for the authorities are not enabled to study each pavement and get data for avoiding similar defects.

Upon the expiration of the guarantee the streets are placed in thorough repair under supervision of inspectors, in some cases to the extent of resurfacing the entire street. The maintenance guarantee, as ordinarily drawn, is not specific enough, leaving too much to the discretion of the authorities, and I believe it should be for a longer time, state as closely as possible what kind and to what extent repairs should be made by patches, filling, skimming, or when to be resurfaced.

Furthermore, an inspector should be placed at the plant of the paving contractor to know what course is pursued there; otherwise the municipality has no data for study of various mixtures, nor does it know that the contractor is carrying out the specifications in this important feature.

MUNICIPAL GOVERNMENT OF NASHVILLE.

BY JOHN L. KENNEDY, BOARD OF PUBLIC WORKS, NASHVILLE, TENN.

At the time of the adoption of our federal constitution and our form of state and national governments American cities were few and small, but the habit of our people has been to concentrate, and we are rapidly developing into a nation of great cities. Three now boast of more than a million inhabitants each. Twenty-five or more exceed 100,000 each, while smaller municipalities ranging in population from 50,000 down to 5,000 are so numerous throughout our states that they scarcely attract the notice of a traveler as he passes them.

The tendency to city life is increasing with accelerated velocity. In each of these cities there must be, subordinate to the federal and state government, a separate and distinct local government emanating directly from the people of the city and operating directly upon them, and in theory conducted according to the expressed will of the majority. The purpose of this separate government is to promote the general welfare; to restrain the vicious; to secure to the provident the fruits of their industry and frugality, and to protect all in life, liberty and the pursuit of happiness in their common affairs. The matters which are most directly committed to the management of this local government are direct taxation and public expenditures, police regulation, fire protection, public property, public improvements, public education, public charities and sanitation, and the granting of franchises to aggregated capital.

These local governments are administered by officials selected by the people from the people whom they serve. Experience has demonstrated the inefficiency of that form of municipal government which confides the entire control of the public business to a body of aldermen and councilmen, who work by and through committees appointed by themselves from amongst themselves, and the tendency now is to concentrate work and responsibility upon a select few chosen for the purpose, reasonably compensated by a fixed salary and held to a strict personal accountability for fault or failure. This movement is in the right direction, but much remains to be done before approximate perfection is attained. It is not supposed that this society can revolutionize the entire system of municipal government, but great good can be accomplished if the members will seek to discover and correct the defects in their respective governments. And it is possible that from necessity and varied experience there may be

evolved ideas and suggestions that will enable some fortunate city to secure for itself a more perfect form of government than any which is represented in this society.

It occurs that this laudable work would be facilitated by examining some particular government, now in operation, allowing each member to compare it with that government with which he is most familiar and note defects and advantages. With this view we present the principal features of the charter adopted in 1883 for the government of the city of Nashville, Tennessee, and which with slight amendments has been the fundamental law for thirteen years.

The city is for municipal purposes divided into twenty wards. The corporate authorities are vested in a mayor and city council, a board of public works and affairs, and in such officers as may be appointed or elected in pursuance of law.

The city council is composed of twenty councilmen elected for a term of four years, at a general election, by the qualified electors at large of the city, but not more than one residing in any ward shall be eligible. This general election is held every two years, when only ten councilmen are chosen.

The mayor is also elected at these general elections for a term of two years. Councilmen receive no compensation. The mayor is paid a salary.

The board of public works and affairs is composed of three members elected by the city council, one member of this board being elected every two years for a term of six years. The members of this board are paid a salary, must not engage actively in any other business, but must devote their whole time to the conduct of the city's affairs. Their duties and responsibilities are great, as will hereafter be shown.

The city council elects a city attorney, city marshal, building inspector, health officer, tax assessor, comptroller, treasurer and recorder, who also presides as judge of the police court. They all have their respective duties under the law and are paid salaries. A board of education is elected by the city council. The members of this board receive no compensation. They have charge of the public school property, select the teachers, etc.

The city council elects its own president, and holds two regular meetings each month, but may be convened in special session at any time on the call of the mayor, or, in his absence, by the call of the president; but at these special meetings business is restricted to the object stated in the call. Laws are enacted after being passed on three several readings by a majority vote, on the third of which readings a majority of the whole number of members shall be required, and a law thus enacted must be submitted to the mayor for his approval. He may approve or veto the law, in whole or in part, but it may be passed over his veto by a majority of all the council. If he neither approves nor vetoes a law within a specified time, it becomes the law without his approval.

The mayor and city council within certain limitations have power by ordinance to levy and collect taxes, to license and tax various lines of business, to appropriate money for the expenses of the city, to make regulations to secure the health of the inhabitants, to establish hospitals, to provide water-works, to establish a system of free schools, to make appropriations for streets, bridges, sewers, etc., to suppress crime, impose fines for breach of ordinance; to grant rights of way through the city to certain moneyed corporations, etc.

The board of public works and affairs has exclusive power and control over the construction, supervision, cleaning, repairing, grading and improving the streets, alleys, avenues, lanes, public wharves and landings, market-houses and spaces, bridges, sewers, drains, ditches, culverts, canals, streams and water courses, sidewalks and curbing, and the lighting of all such public places,

repairing, cleaning, lighting and heating of all public buildings (except public school buildings) and grounds, and over all public improvements of the city.

The board of public works and affairs has exclusive power to employ such chiefs and heads of departments, policemen, firemen, engineers, superintendents, clerks and other persons necessary for the execution of its duties, and fix their compensation within limits prescribed by the mayor and city council, but the wages of common laborers are fixed by the board. All these employees may be removed at will by the board. This board also has the exclusive power to organize and control the police and fire departments, to control the water-works and its appurtenances, the workhouse and the city hospital.

On a fixed day in each year the board of public works and affairs prepares and submits to the mayor and city council an itemized estimate of the amount of money deemed necessary and advisable to spend in the execution of the duties of the board for the ensuing year, specifying for what department, etc. This estimate is considered by the mayor and city council, and after being allowed in whole or in part, the taxes are collected accordingly, and carried to the credit of the board of public works and affairs. This fund is then drawn upon by the board for expenses incurred and improvements made during the year.

Contracts over \$50 and less than \$500 are let to the lowest competent responsible bidder, without referring the matter to the council. But when any contemplated expenditure exceeds \$500 the board first transmits to the mayor and city council a careful estimate of the cost of the material or work, with an ordinance authorizing the expenditure. If the mayor and city council approve of the expenditure the ordinance is passed, the money is appropriated, and the board proceeds to make the purchase or execute the work, awarding the contract to the lowest competent responsible bidder. If the proposed expenditure is not approved, the ordinance is rejected and the money remains in the treasury.

The council cannot compel the board to make any specific improvement or expenditure, and is itself forbidden to make any appropriations of money or credit in the way of donations, etc. Neither the council nor the board can appropriate the revenues or taxes for any purpose other than strictly municipal purposes.

The foregoing is an outline of the fundamental law of the city as established by the state legislature; and the state legislature only can alter or amend it. There are many minor, but salutary, checks and restraints throughout the entire system of the government.

Business sessions of the board of public works and affairs are open to the public, a record of the proceedings is kept, and any citizen may consult the same.

Under this form of government the city has been administered since 1883, and public progress has been great, as attested by many new and handsome public buildings, extensive and substantial streets of brick, granite and macadam; a system of sewers eight or ten times as extensive as in 1883; a free iron bridge of ample dimensions and handsome design spanning the Cumberland River; a city hospital; a city water-works of a capacity more than twice the present necessities; a fire department and a police department ranking with the best in the country.

The taxable property of Nashville, as returned by the assessor in 1883, was \$17,198,389. In 1895 it was \$35,072,475. The population in 1880 was 43,350; in 1890 it was 76,308, while in 1895 it was fairly estimated at 87,000.

Nashville's experience has demonstrated the value of her present form of government. Great good has resulted from the election of the councilmen by a vote of

the entire city; the power of the ward politician being thus minimized. And the election of only a portion of the council at one time and one member of the board of public works and affairs at one time is a great advantage, the effect being to secure experienced officials at all times and to protect the city against the shock incident to periodical and entire change of administration.

It is a wise policy, too, that confers upon the mayor and city council the sole authority to levy and collect the city taxes, and to restrict the expenditure of the same, but with no power to direct or compel it. The board of public works and affairs being alone empowered to make public improvements, must show good reason for any proposed expenditure before the council will appropriate the necessary money. This prevents favoritism to localities or individuals.

The board of public works and affairs being held responsible for the proper performance of the duties committed to its charge, is wisely permitted to employ and to discharge at will all subordinates. This secures skill and fidelity.

It is believed that Nashville's system of government may well be adopted by a city of far greater proportions. It must be conceded, however, that no form of government has ever been devised that will secure the blessings of civilization and liberty to a people who are not ever watchful and true to themselves. Honesty and intelligence must be constantly on the alert.

The writer ventures the opinion that the best form of city government is one that is as simple in construction as practicable, and with which the people can easily familiarize themselves. And that it should be administered by a limited number of executive officials clothed with ample power to properly perform all required duties, being permitted to select their own heads of departments to whom special work is assigned, and to discharge at will any head of department or subordinate.

The legislative department and the executive department should be distinct and the line between their respective duties and authority well-defined and insurmountable. The legislative department should provide the revenues, but should not direct the expenditure. The executive department should have no authority to raise any revenue, but should have the exclusive power to expend the same under such restrictions as the legislative department might impose to secure fidelity and to prevent a subordination of the public good to the interest of a select few.

The salaries paid to these various officials should be sufficient to attract men of the first order of business and sagacity, and their terms of office should be of long duration, expiring periodically, but so adjusted that less than a majority will go out of office at any fixed time. But paramount to all else it is necessary to place honest and intelligent men in office. Honesty and intelligence can safely administer any form of government until it can be changed, but ignorance and dishonesty can injure and distress a people under the best possible form of government.

To place good men in municipal office is sometimes difficult, but this would be largely overcome if at the popular election no other matter was voted upon. The election of no county, state or federal officer, nor the decision of any economic question should be submitted to the people at the time when they elect their municipal officers. There would then be less swapping of votes and pooling of issues and little opportunity for moneyed combines or evil-doers to influence elections by the use of money or by other wrongful methods.

By the law of France, a tax of 10 francs (\$2) a year is levied on all bicycles, tricycles and tandems.



27 A GROUP OF TWENTY MAYORS.

BROOKLYN EXCISE DEPARTMENT.

The office of Colonel Harry W. Michell, special deputy excise commissioner for Kings County, has recently been officially examined and pronounced the model office of the state. The examiners found that Colonel Michell had perfected an admirable system upon which to conduct



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the important affairs of his office, that the records were written up to date and errorless, that the collections were promptly and carefully handled, and that all of the business of the office was transacted in a methodical manner. All this is especially complimentary to Colonel Michell, when it is taken into consideration with the fact that the Brooklyn office is one of the most extensive in this state, having

issued licenses to the number of 4,000 and over under the new law and having made collections aggregating about \$2,500,000 since May 1. Another point in the deputy commissioner's favor is that he has conducted his office with a force far less, numerically, than is allowed by the law. The Brooklyn office has only four special agents, while it is entitled to twelve, and it has no auditor. The office force consists of the special deputy commissioner, a cashier, an assistant cashier, a confidential clerk, a stenographer and five clerks. Still, with this relatively small force, the Brooklyn excise office has been declared the model one of the state.

Colonel Michell, the head of the office, is one of the best known and most popular citizens of Brooklyn. He has served in the National Guard for thirty-five years and is Colonel of the Fourteenth Regiment, N. G., N. Y.

BROOKLYN'S CHIEF ENGINEER.

Peter Milne, chief engineer of the Brooklyn department of city works, occupies a most important and responsible position. The construction and maintenance of all of the great public works of Brooklyn are under the supervision of Mr. Milne, who performs the complex



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and exacting duties of his office with rare skill and judgment. Under his control there are five divisions of city work, the subordinate engineers of which are: I. M. de Varona, water supply; C. H. Myers, sewer construction; N. P. Lewis, street construction and repairs; W. E. Belknap, Wallabout improvements, and E. S. White, construction and repairs.

Mr. Milne was appointed to his present position by Commissioner Willis on May 14, 1896. Prior to that time he was the city's water purveyor for a number of years. In his profession, Mr. Milne holds an eminent position, his training and experience having been of the highest order. Brooklyn is fortunate in having such a competent man at the head of its engineering staff.

THIS DOCTOR FAVORS FLUSHING.

Dr. William Dickore, a Cincinnati chemist, is urging a change in the method of cleaning streets in his city. He suggests that the city be divided into small districts, each in charge of one man, with a long line of hose, who shall flush his district daily from the fire plugs.

"It is done in many of the great cities of Europe," says the doctor. "Our system of sweeping grinds up all the filth on the streets and sends it into our houses, where we breathe in it the germs of disease. Besides, it does not clean the streets. The dirt is piled up and left lying for hours, and afterwards is trampled about and blown about till it can not be shoveled up. The cost of flushing would not be greater than the cost of sweeping. It would take more men, but no horses. Most of the expensive system of city stables could be abandoned, and the money spent for horses given to laborers in wages."

TROLLEY LINES IN BOSTON.

Boston has one of the largest trolley systems in the country, yet the number of small companies springing up in the suburban cities and towns and seeking entrance into Boston continues to increase. The authorities of the Watertown Arsenal have lately given permission to the Newtonville & Watertown road to lay tracks across the government grounds and thus enter the Brighton district of Boston. Another company, the West Roxbury & Roslindale, has just opened a road from Forest Hills to Dedham, through a region hitherto undesecrated by the broomstick train. A third company is making efforts to build from Newton, through Brookline into the city, but as it has been shut out of the subway by recent legislation, the company may never begin operations.

—An alderman who is a member of two aldermanic committees is entitled to cast two votes in committee when the committees to which he belongs meet in joint session. Such at least is the case in Milwaukee, according to an opinion rendered by the city attorney of that city. The committees on public buildings and schools were struggling over the choice of plans for a new school building and the chairman of the joint meeting ruled that Ald. Okershauser, who was a member of both committees, was not a bigger man than any man of either committee. Ald. Okershauser, however, had an idea that he was worth just as much as any two of the other members, when it came to voting, and he submitted the matter to the city attorney. The city attorney's opinion created a great deal of surprise among the city officials of Milwaukee.

—It is likely that there will be a separation of grades between Woodward avenue, the most important street in Detroit, and the tracks of the Michigan Central, the Lake Shore and the Grand Trunk railroads. The companies have offered to raise their tracks about five feet and a half and build a bridge, if the city will sink the roadway seven and a half feet. The proposition may be accepted, although Mayor Pingree has heretofore insisted that the railroad companies ought to sink their tracks uniformly around the city and thus separate the grades without expense to the city.

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IN MUNICIPAL AFFAIRS.

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NOTE AND COMMENT.

The fire commissioners of the city of Buffalo seem to need a little shaking up. For the past fifteen years they have been exercising rank favoritism in the purchase of department supplies, and during all this time their arbitrary and unwarranted actions have cost the taxpayers of Buffalo no inconsiderable sum of money. The commissioners have, without apparent reason, assumed that the fire hose made by the Eureka Company is the only hose fit for use in the Buffalo department, and they have adopted specifications which preclude the possibility of any competition in selling hose to them. They advertise for bids whenever they want to buy hose, but their advertisement shuts out all other manufacturers in the interest of the Eureka Company. The commissioners might as well save the money they spend for useless advertising, because their specifications permit no one to bid except the Eureka people. For many years the Buffalo taxpayers, through the agency of their fire commissioners, have been paying 90 cents a foot for Eureka hose, while they could have purchased other hose equally as good, and perhaps better, at a much smaller price. Furthermore, if fair and business-like competition had been permitted in the bidding, perhaps the Eureka Company would have recognized the necessity of offering their hose at a lower price. In the purchase of hose the Buffalo commissioners have either lacked common business ability or indulged a disposition to be unfair with the people whose money they spend and with the score or more of hose manufacturers in this country.

The commissioners attempt to justify their peculiar methods by claiming that the Eureka is the only hose fit for use in Buffalo. This is an absurd contention. By their own experience the Buffalo commissioners are not competent to judge the comparative merits of various makes of hose, for they have not used any except the Eureka during the past fifteen years. If they are to judge by the experience of other fire departments they are confronted with the fact that in other cities hose equally as good as the Eureka is in use. If Eureka hose possesses marked superiority over all other makes, it is a

wonder that first-class fire departments in cities other than Buffalo have not taken to its use exclusively.

The fire commissioners of Buffalo may have a legal right to exercise their poor judgment at the expense of the taxpayers, but they have no moral right to do so. It is their official duty to transact the business of their department with fairness and economy.

Buffalo is perhaps the only city in the country where the people's servants have had the audacity to establish and perpetuate a monopoly in the fire hose business. In many other cities, however, monopolistic measures no less antagonistic to the public welfare have been promulgated by public officials. We have in view the various cities where officials in charge of public works have adopted specifications for asphalt paving which permit only the use of the Trinidad material. Such specifications permit no one to bid for paving contracts except the Barber Asphalt Company and its agents. The Barber people control the Trinidad material, and in cities where no other asphalt is admitted to competition they may set their own prices. It is a significant fact that in cities where Trinidad asphalt has been secured at the lowest figures, the specifications have admitted bids on other materials. This is the natural result of competition, and the relative merits of the different materials need not be considered. As long as officials permit the Barber company to enjoy a monopoly in any city, the property owners of that city cannot reasonably expect the company to reduce its prices. The moment that competition enters into the matter, no matter whether or not the competing material is as good as the Trinidad, the Barber company will be forced to lower prices.

The awakening of the people to the importance of competition in public as well as private business has already resulted in the abrogation of the Barber monopoly in some cities. A number of cities that formerly permitted only the use of Trinidad material are now advertising for bids on other asphalts as well. In all such cases the result has been a considerable reduction in the cost of asphalt paving, whether of Trinidad or other material.

While on the subject of asphalt paving, it might be well to state that the Trinidad material, meritorious as it is, has found some very worthy competitors. CITY GOVERNMENT is now making an investigation in a Western city where Trinidad and other asphalts have been used extensively, the result of which will be published in an early issue. This report will show conclusively that Trinidad asphalt gives no better satisfaction than some of the other asphalts.

By the verdict of the majority of the New York fire commissioners, J. Elliott Smith, superintendent of the fire alarm bureau, is a competent official and his department is in a satisfactory condition. This verdict comes in the face of the facts that the New York fire alarm system is absolutely the worst in this country and that it has

not been properly improved under Mr. Smith's superintendency. Several months ago Superintendent Smith was charged with incompetency and other faults; he was given a long trial by the fire commissioners, and now two of the three commissioners have decided that the charges have not been sustained and the superintendent must be reinstated.

The decision of the two commissioners forms nothing more nor less than another case of "white-washing," so common with municipal official investigations in this country. At the trial of Superintendent Smith it was proved that in Brooklyn, Boston, Pittsburg and Newark, having 2,092 fire alarm boxes, there were two cases of failure in giving 4,509 alarms, while in New York, having 1,259 boxes, there were 101 failures in giving 4,874 alarms. It was also proved that the underground fire alarm cable system of New York, which was constructed at a cost of \$450,000, has made a record of failures and defects very many times in excess of what could be reasonably expected, as for example, that during the month of January, 1895, there were twenty-seven cases of fire alarm circuits "open," and all apparatus thereon disabled for an amount of time equivalent to one circuit being useless for three days and seventeen hours. As a matter of fact, nearly all of the competent testimony given at the trial showed the fire alarm system of New York to be in a most deplorable condition and a menace to the safety of life and property. Yet Commissioners Sheffield and Sturgis voted to reinstate Superintendent Smith, thereby giving their official approval to New York's inefficient fire alarm service. They may some day feel the full force of the remarks of Commissioner La Grange, who voted against the reinstatement of Superintendent Smith. Mr. La Grange said:

"If this system be continued as it exists, even for a limited time, it is a certainty that some open circuit, or some failure of a box to send in an alarm when pulled for fire, will result in a conflagration and loss of life and property which will arouse our citizens from their apathy on this subject, and they will compel reform. If this board shall attempt to reform this service by reinstating in office the man who has deformed it, and secretly kept it deformed, that will be an affair of the majority of this board, but not an affair of mine. I decline that responsibility, and vote to find the superintendent guilty of incompetence under the eighth charge, and that he be removed for 'conduct inconsistent with the office he holds,' and for 'incompetency' in said office."

Voting by machine was a failure in several eastern cities on November 3. The Meyers machine, which was used at Rochester, N. Y., did not come within a mile of meeting the expectations of its friends. In a number of the precincts many more voters were recorded as having entered the booths for the purpose of voting than were registered by the machines as having actually voted. This discrepancy is said to have been caused by defects in the mechanism of the machine. During the day a number of machines had to be repaired, and in such cases the secrecy of the ballot could not be preserved, for the figures were revealed to the man making the repairs. Nearly all of the Rochester aldermen, who voted to give

the Myers machine a trial, are now convinced that it is not capable of satisfactorily performing the work it is designed for. The McTammany machine, which was used at Worcester, Mass., and the Davis machine, used at Hornellsville, N. Y., were also failures.

TAXES AND FINANCE.

—The city of Milwaukee, which, in common with other cities, has of late experienced considerable trouble in disposing of municipal securities, has finally succeeded in placing \$540,000 of its bonds and is now contemplating the issue of \$200,000 more. Three months or more ago the city decided to issue bonds aggregating \$540,000, and although Milwaukee bonds had before commanded premiums of about 12 per cent., it was not until October 27 that the city finished disposing of all the bonds, and in no case was the premium more than 9 per cent. The first time that the commissioners of public debt met to sell the bonds they received, instead of the usual score or more offers of high premiums, a bid from S. A. Kean, of Chicago, of a premium of one-fourth of one per cent., and another bid, from E. B. Underhill Co. of New York, of a premium of 2 1-2 per cent. At the previous sale of municipal bonds, in June last, a premium of almost 12 per cent. was bid for securities aggregating \$420,000, and the difference in the bidding in the short space of time proved startling to the commissioners of public debt and to the other city officials. They finally pointed out that New York had been unable to sell its 3 1-2 per cent. bonds and that Brooklyn had failed in a similar attempt. They decided to wait for better bids. They met again a few days afterward, and the Northwestern Mutual Life Insurance Company, of this city, offered \$564,455 for the whole issue of \$540,000, a premium of about 4 1-2 per cent. The Milwaukee Mechanics' Mutual Insurance Company, of this city, and E. C. Stanwood & Co., of Boston, offered a premium of 5 per cent. for a small portion of the issue. E. Beekman Underhill, of New York, sent in the lowest bid. He offered a premium of 5-8 per cent. for the whole issue. At the next meeting of the Board C. H. White & Co., of New York, offered 6 per cent. for \$200,000 of the bonds, and the Milwaukee Mechanics' Mutual Insurance Company offered 6 per cent. and 7 per cent. for a part of the bonds. These bids, like the ones which had preceded them, were rejected. A few days later the commissioners of public debt sold \$160,000 of the bonds to the Milwaukee Trust Company at 106. Mr. White, of New York, wanted an option on the entire issue at 106. He finally made an offer of 107. E. D. Shepard & Co., of New York, offered 108.22 for \$220,000 of the bonds on condition that they were not delivered until November 15. The commissioners declined this offer, principally on account of the deferred payment. Nor did they, after they had sold more of the bonds, accept bids running from 105 1-2 to 107. They even rejected bids of 7 1-2 made by E. B. Underhill, Jr.,

of New York, and E. H. Rollins' Sons, of Boston. The latter raised their bid on October 27 to 108.52 and got \$160,000 of the bonds, all that remained unsold. The purchasers of other bonds were C. H. White & Co., of New York, and Seasongood & Mayer, of Cincinnati. It has been the first time in many years that the city has experienced any difficulty in disposing of its bonds, which, in fact, have the distinction of bringing the largest premium ever paid for municipal securities, at least in America. The price that has been paid for the last issue amounts to about two-fifths of the price which Milwaukee bonds commanded at the last previous sale.

—The largest bond sale ever attempted by the city of New York terminated successfully on Nov. 11, when \$16,046,590.70 of bonds were sold to Vermilye & Co. at 104.71. The bonds are exempt from taxation, are payable in gold, bear $3\frac{1}{2}$ per cent. interest, and run from fifteen to thirty years. They are divided as follows: seven million dollars for the redemption of bonds maturing this year, \$1,925,141.37 school-house bonds, \$1,750,000 additional water stock, \$1,200,000 for the payment of State taxes, \$1,000,000 dock bonds, \$600,000 for repaving streets, \$400,000 for the construction of the Harlem River Bridge at Third Avenue, \$102,849.33 for sanitary improvements in school-houses, \$158,600 for grounds and buildings for the College of the City of New York, \$85,000 for the expenses and awards of the Change of Grade Damage Commission, \$300,000 for the construction of the new East River Bridge, \$250,000 for the new east wing of the Museum of Natural History, \$175,000 for the improvement of parks and driveways, and \$100,000 for repaving roads and avenues in the Twenty-third and Twenty-fourth Wards.

—Cleveland, Ohio, sold \$100,000 of water-works bonds to Deitz, Dennison & Pryor at \$106.027.

—Cleveland, Ohio, park improvement bonds, amounting to \$250,000, will be sold on Jan. 6.

—Brooklyn bonds, amounting to \$2,115,242.41, were sold on Nov. 5. The bonds bear interest at $3\frac{1}{2}$ per cent., and the total premium realized on the sale amounts to \$16,194.12.

—The Malden, Mass., board of aldermen has increased salaries as follows: Clerk of board of health, from \$225 to \$600 a year; city solicitor, from \$800 to \$1,000; city physician, from \$400 to \$600.

—The city of Richmond, Va., has cut down the salary of the city engineer from \$5,000 to \$3,600 a year.

—The Kansas City council has decided to impose a tax of \$100 a year on all divine and magnetic healers, mind readers and spirit mediums, clairvoyants and palmists.

RAILROAD TAXATION IN NEW JERSEY.

BY JOSEPH A. DEAR, JERSEY CITY.

There have been three distinct eras in which three different systems of assessment and taxation of railroads have existed in this state. The first was the system inaugurated when a charter was granted to the Camden and Amboy. It consisted of the imposition of a transit

duty to be paid in the first instance by the railroads for each passenger crossing the state, and in later instances of a tax on valuations made by the railroads themselves while all the property of the railroads was exempt from all other taxation. This lasted till 1869, when the transit duties were repealed and a tax of one-half of one per cent. was levied by the state, except on such companies as had irrevocable contracts, on the cost of each railroad and its equipment for the sole benefit of the state, and in lieu of all other taxes and assessments. This second era closed with the passage of the act of 1873, by which the claims of the municipalities were first recognized. In this act, while the old provision of a tax of one-half of one per cent. on cost of road and equipment for the sole benefit of the state was retained, it was for the first time provided that a tax not exceeding one per cent. might be levied on the property of the railroads for the benefit of the municipalities through which they ran. The benefits that might have accrued to the cities through this provision were greatly reduced by the unreasonable exemption of main stem and ten acres of terminal property. The disappointment and consequent dissatisfaction caused by the operation of the act of 1873 led to the passage of the act of 1884, and the amendment thereto of 1888, under which we now live. The main features of both the acts of 1884 and 1888 are the division of all property used for railroad purposes under four classifications, as follows:

First—Main stem, not to exceed one hundred feet in width, including passenger depots or stations. This class is taxed one-half of one per cent. for the benefit of the state alone.

Second—All property used for railroad purposes outside of main stem. This is known as second-class property, and is taxed not exceeding 1 per cent. for the benefit of the taxing district in which it is assessed, in addition to one-half of one per cent. which goes to the state.

Third—All tangible personal property. This is taxed one-half of one per cent. for state purposes only.

Fourth—The franchise and all other property. The franchise is taxed on its assessed value one-half of one per cent., as is the "other property," of whatever it may consist; stock or bonds of other companies, most probably. Real estate owned by the railroads, but not used for railroad purposes, does not come under the operation of this act, and, of course, is taxed at full local rates.

It is evident from this sketch of New Jersey railroad legislation that since 1873 the law has expressly recognized the right of the municipalities to impose and collect taxes on railroad property. This right has, however, been grudgingly conceded and unduly restricted, yet it will be seen hereafter that it is still a most valuable one. To the lay mind it would seem that under the provisions of the amendments to the constitution that "property shall be assessed under general laws and by uniform rules at its true value," municipalities should be entitled to assess and collect taxes on the railroad property within their limits in the same manner and at the same rates as they do all the other property. The Court of Errors and Appeals, however, has decided that this is not the case, and that a system of classification which a learned member of the court pronounced "arbitrary and fanciful" was in accordance with the constitution, and that the legislature had not transcended its powers when it established this "arbitrary and fanciful" classification, with varying rates for the same kinds of property, which same kinds of property it has chosen to group under different classifications. The policy of maintaining this arbitrary classification is, however, now loudly challenged.

When so important a change in the law is proposed it is reasonable we should be asked "to what extent does the prevailing system of classification for purposes of assessment operate as a real and substantial grievance

demanding the immediate attention of the legislature." Let the following figures answer. The total valuation of all real estate in the state of New Jersey was \$798,793,632 in the year 1895. Of this great sum the individual holdings amounted to \$662,833,068; the holdings of the railroads and canal corporations were \$135,960,564. The amount of taxes paid on real estate held by individuals was \$10,230,000, or 1.54 per centum; the amount paid by the railroads was \$1,261,003, or 93 per centum. Individuals, farmers and manufacturers whose business has been unusually depressed during the past three years have thus had to pay a rate of taxation averaging more than 65 per cent. in excess of that paid by the wealthiest corporations in the state. Will it be for a moment contended that this division of the burdens of the state government is in proportion to the abilities of the two classes of taxpayers? It is not; and the system which places the heavier burden on the weaker and poorer taxpayer is an injustice that should be speedily ended.

With the exception of the neighboring state of Pennsylvania, we should look in vain over every state of the Union for a parallel to this legal and economical monstrosity.

Further, the present system inflicts a serious loss on every county in the state. The amount of railroad property of the second class in the various counties of the state is \$41,120,216, as computed by the state board of assessors. The tax now paid on this amount is stated by the same board to be, for 1895, \$400,694.50. Were this property taxed at the same local rates as paid by individual real estate owners the sum collected would be about \$786,800. If the main stems of the roads paid local rates, \$94,840,348 more of ratables would be available to lighten the present burdens that are so crushing to private real estate owners. Their present taxes would be reduced by the amount of \$1,696,291.13, the amount of taxation the railroads escape, and which, of course, is borne by individuals.

As it is claimed that the railroads already pay more than they can bear, it will be well to note what they have to pay in adjoining states. The total tax assessed on the roads in this state in 1895 was \$1,514,411.26. Their gross earnings amounted to \$42,512,657.86. The taxes were therefore 3.6 per cent. of the gross earnings for that year. The railroad commissioners of New York report the taxes paid by all the railroads in that state as \$7,365,336.77 for year ending June 30, 1894; the gross earnings for same period \$197,957,315. In New York, therefore, the taxes paid are 3.72 per cent. of gross earnings. In Massachusetts on gross earnings of \$70,424,840.45 the total taxes paid were \$3,500,162.18, or at the rate of five per cent. of gross earnings. In Cook county, Illinois, on a gross valuation of only \$18,671,732 the railroads pay taxes amounting to \$1,206,670.97, or 6.46 per cent., while the Illinois Central alone pays to the state seven per cent. on its gross earnings. The taxes paid by the railroads in this state are therefore less than they pay in other states.

They are, however, not only not paying their equitable share of the taxes, but they are dodging the taxes for which the law makes them liable. The act of 1884, in defining "main stem," provides that in case any railroad should have more than one line or branch in any county only one of such branches should be considered as main stem, the others only as property belonging to the second class and taxed as second class. The companies are, however, evading this provision by forming separate companies for each new siding or branch they construct. The Lehigh Valley, the National Docks, the Pennsylvania, the Jersey Central and West Shore each have branches in Hudson county that should be taxed as second-class property. Short branches not exceeding half a mile in length have had full fledged companies organized to

operate them. The officers are generally the same as the officers of the parent company, but by virtue of the legal fiction of separate corporate existence the half mile of track becomes "main stem" and thus escapes local taxation.

The present system not only defrauds the municipalities now, but it threatens them with still worse to come in the future. Every apparently unoccupied foot of meadow land on New York Bay or the Kills is already held either by the railroads in their own names or those of their agents. In Jersey City the holdings of the railroads that were 944 acres, valued at \$30,582,302 in 1885, had grown to 1,155, valued at \$38,758,513 in 1895. Over \$8,000,000 have thus been taken from the ratables of this one city in ten years, and within the past five years over \$9,000,000 of additional property has been purchased by the same parties, and, unless the law is amended, will be withdrawn from the city ratables in a comparatively short time. The same process is taking place at Camden, Perth and South Amboy, Bayonne, Elizabethport, Weehawken and Phillipsburg, though to a less notable extent.

In every city of this state the valuations have steadily been pushed upward for years, until they are in many places beyond the actual value of property in these hard times. There has, however, so far as I can make out, been no revision of the railroad assessments to meet increased values of property, though the state board has been alert to include in its assessments all improvements, in the way of new switches, tracks, buildings, etc., as soon as made.

The state could well spare some of the steadily increasing income it derives from this source and share it with the municipalities. The expenses of the state have unwarrantably increased of late years; salaries have been increased, offices created and work undertaken that might have been postponed till the advent of more prosperous times. A little wholesome frugality for the next few years would allow of a diversion of many thousands of dollars, that it receives from railroad and miscellaneous corporation taxes, to go to the relief of the overburdened taxpayers and real estate owners of both cities and counties. This diversion of state income, however, is not necessary if only the railroads be made to pay their fair share of taxes. The bill introduced by Mr. Queen last year proposes to tax "main stem" and all other property used for railroad purposes at local rates, less one-half of one per cent. to go to the state. This would be theoretically just, but is perhaps hardly necessary. If the tax on main stem were increased, say 33⅓ per cent., this increase to go to the taxing districts, while the rate for second-class property were increased to full local rate, the amounts available for localities would be: From main stem about \$360,000; from second-class property probably \$400,000, or in all \$1,060,000, in place of the \$410,862 received by localities in 1895. This is not put forward as strictly realizing the ideal of equal taxation, but it would provide an immense relief to all the counties and municipalities of the state, would be a step in advance which would make easier the complete equalization to be ultimately effected, and would be more easily secured than if a radical course were at once attempted. Even this installment of justice would remove from our state the reproach to which she is now justly exposed that she maintains a system of taxation that oppresses the poor and favors the rich.

Pittsburg officials are figuring on the cost of an electric light plant for the city. The only thing that keeps it back is the fear that after it is purchased and put into operation, the march of electrical science will be so rapid that the plant will be out of date.

LIGHT AND WATER.

Registrar Geilfuss, of the Milwaukee water department, is strongly advocating a reduction of the charges made for water furnished to consumers who do not use meters, which means a great majority of the consumers. His idea is that these consumers should be given the benefit of the surplus earnings of the department in excess of the sum required annually for the expense of maintaining and operating the department and of the amount needed for the interest and sinking fund for water-works construction bonds. The surplus for last year was \$85,000, and it has been the custom to turn this surplus over to the general city fund. This disposition of the surplus, it is asserted, is unlawful, because the law authorizing the city to construct and maintain a system of water-works and to issue bonds therefore requires that all income derived from the system shall be applied to paying the interest and principal of the bonds used in its construction. It may be that the present agitation will result in a new schedule of water rates, making a reduction of about 20 per cent. in the present rates, but Chairman Caufy, of the committee on water-works, states that there will probably be no report for some time, as a sub-committee would probably be appointed to make a full and searching investigation of the matter.

—The Southington (Conn.) Water Company has decided to extend its mains.

—The water board of Rome, N. Y., is about to adopt a system of meters. The members of the board are of the opinion that the absence of meters permits a very great waste of water.

—Crawfordsville, Ind., has voted to issue \$20,000 of bonds for a new water system.

—Joseph J. DeKinder and M. Richard Muckle, Jr., have been appointed members of the special commission at Philadelphia to investigate and report upon the estimated cost of construction and maintenance of a municipal electric light plant. Messrs. DeKinder and Muckle will select the third member of the commission.

—The Waltham, Mass., board of aldermen has appropriated \$24,000 for the purchase of an additional pump for the water-works.

—Pittsburg wants water filtration. A commission is now examining into the merits of the various systems.

—Mayor Swift, of Chicago, has appointed a commission of five experts to investigate the causes of the pollution of the water supply and report plans for remedying the matter. The experts are Commissioner of Public Works Downey, General Wm. S. Smith, Lyman E. Cooley, Ex-City Engineer Samuel G. Artingstrall and City Engineer Benzenberg, of Milwaukee.

—The voters of Piedmont, W. Va., have decided that the town should own and operate an electric lighting plant.

BALTIMORE WATER-WORKS CHANGES.

The Baltimore Water Board has adopted the recommendations of Samuel M. Gray, of Providence, who was employed as a consulting engineer to ascertain what improvements are needed in the water supply of Baltimore, especially with reference to future increased demands.

The chief changes suggested by Mr. Gray to bring about the successful operation of the scheme which he proposes include the construction in the near future of a reservoir at Walbrook; the construction further of a second additional reservoir on high ground near the Reistertown turnpike; the erection of a pumping station on North avenue, adjoining Mount Royal reservoir; the enlargement of the Oliver street pumping station by placing a reserve pump there of the same capacity as the 10,000,000-gallon pump now used; that Mount Royal reservoir be abandoned, because of its small capacity and low elevation, and that the pumping station in Druid Hill park, on the north side of Druid lake, be also abandoned, because the changes in service will render it useless.

With the report is submitted an estimate of the total cost of the improvements which he suggests. The estimate is as follows: 75,000,000-gallon reservoir and land for same, \$450,000; two 17,500,000-gallon pumps, in place, \$130,000; pumping station and stack, \$90,000; one 10,000,000-gallon pump, in place, in exchange for old 5,000,000-gallon pump, \$35,000; five 150-horse power boilers, in place, \$15,000; 13,500 linear feet of 48-inch suction main, \$202,500; 13,500 linear feet of 36-inch force main, \$121,500; screens and screen fixtures for gatehouses, in place, \$12,800; schemes for supplying upper service area, \$193,200; distribution of mains and valves, \$735,700. Total, \$1,985,700.

FIRE AND POLICE.

—A paid fire department is proposed at Lockport, N. Y. It is likely that the change will be made early in the new year.

—Cambridge, Mass., will probably have a new central fire station in the near future. It is proposed to make the new building a model fire-house, with all the latest improvements.

—The Newark, N. J., police commission is trying to secure a new central station for the police department.

—A new fire-engine house will be established in the Fifth ward, Pittsburg, next year.

—A chemical engine company has been added to the Hartford, Conn., fire department.

—Springfield, Mass., has appropriated \$17,000 for a new hose house.

—Minneapolis council has ordered the city clerk to advertise for bids for 5,000 feet of steam fire-engine hose.

—Moses W. Cortright, formerly inspector, has been made deputy chief of the New York police, at a salary of \$5,000 a year.

—Congress will be asked to make an appropriation for a fire boat for the city of Washington.

—The fire commissioners of Detroit, Mich., will endeavor to get an appropriation for a new truck house in the northeastern part of the city.

—The Albany, N. Y., council has authorized the fire board to add 34 men to the paid fire department. These additional employees are to be taken from the ranks of the call men. The salaries of the permanent men have been fixed at \$720 per annum.

—The police commissioners of Bridgeport, Conn., have asked the council to empower them to increase the force of police patrolmen to a complement of fifty men.

—Niagara Falls, N. Y., will probably add a chemical engine to its fire department equipment.

—Frank Plinda has been appointed chief of police at Schenectady, N. Y.

—Oliver Knapp has been appointed chief of the fire department at St. Joseph, Mo., succeeding Michael Kane, who has been disabled by injuries received in the service.

—The fire department at Waterbury, Conn., is to have a new chemical engine.

—The Boston police commissioners, inspired probably by the example of Mr. Roosevelt, are discountenancing in every way the so-called "protection" of saloons, restaurants and other public places by the patrolmen. A short time ago, two superior officers started upon an investigation of their own and found two South End officers eating in a restaurant when they should have been patrolling their beats. The culprits were brought before the police board and fined according to the length of time which each had taken from his tour of duty. Since that time, investigations have been made and the commissioners have requested restaurant keepers to complain of any attempts made by patrolmen to obtain "free lunches."

INVESTIGATED POLICE DEPARTMENTS.

Capt. George W. Wittman, of the San Francisco police board, who was sent on a tour of the United States to investigate the police methods of the larger cities, has submitted his report. The cities visited by the captain were St. Louis, Chicago, Minneapolis, Cincinnati, Louisville, Atlanta, Washington, Baltimore, New Orleans, New York, Brooklyn, Boston, Providence and Philadelphia. He thinks that the Brooklyn department is the best he investigated, and devotes five of the twenty-two pages of his report to that city. He gives a mass of statistics about the salaries paid, the make-up of the force and the method in which it is conducted.

"The police stations," he says, "are simply perfection, being built of brick and stone, three stories in height, fifty feet frontage and all on street corners, with patrol wagon stable attached, each station having complete dormitory facilities for the men and all well furnished and supplied with bath rooms, etc."

"I witnessed the annual parade of the Brooklyn police,"

proceeds the captain, "and it was a very creditable affair. The parade was held on the afternoon of May 23, and passed the reviewing stand at 3 P. M. There were 1,600 men in line, marching four divisions of 400 men each, a brass band to each division, and each division under immediate command of an inspector of police. The men made a very fine appearance. They were all in full dress, with the regulation belt and baton. The patrolmen wore a red cord and tassel on the baton, the sergeants blue, the captains, inspectors and chief wore a white cord and tassel. The patrol wagons brought up in the rear of each division, and the rear of the column was composed of two companies of park police.

"Taking it all in all it was a very fine display, and reflected great credit on the commanding officer; in fact, I would not be doing justice to my theme if I did not say a few words here of Mr. W. J. McKelvey, the most efficient superintendent of the Brooklyn police department. I found him an excellent gentleman and a most thorough disciplinarian and commander. He has brought the Brooklyn department up to a standard of which he can well be proud, and though in command of 1,800 men, he can always find time to treat all who have business with him with civility and consideration. He is a thorough police officer, having associated himself with the department thirty-three years ago, and served in it continuously in the various capacities, from patrolman to roundsman, to sergeant, to captain, to inspector, and finally to superintendent of what I consider the finest police department in the United States."

Captain Wittman praises the New York police force, and says that he witnessed the parade of that department. "Although the display was fine," he adds, "the marching was not as perfect as that of the Brooklyn force."

Of the New Orleans police the captain says that a "don't care" system seems to prevail, and that the police are "undersized and slouchy looking, and are not up to the standard of intelligence that is necessary to a good department."

In closing, Captain Wittman says that the departments that were most removed from politics were the most efficient and best disciplined, and gave better satisfaction to the public at large.

SCHOOLS AND LIBRARIES.

—A public library has been opened at West Indianapolis, Ind. Miss Gertie Hilligos is the librarian.

—The Detroit School Board has reconsidered and tabled its resolution providing for the introduction of Bible readings into the public schools.

—The total enrollment in the Chicago public schools on the first day of the present term was 196,842, or 16,500 greater than one year ago.

—The voters of Hartford, Conn., have decided to appropriate \$160,000 for an addition to the high school and \$16,500 for a manual training school.

—The annual report of the Cincinnati public library shows that there are 215,596 volumes on the shelves and 24,772 borrowers. The total expense of the library for the year amounted to \$54,066.14.

—A new public library building, to cost \$250,000, is to be erected at Newark, N. J.

—C. B. Gilbert has resigned as superintendent of the St. Paul public schools to accept a similar position at Newark, N. J.

PUBLIC IMPROVEMENTS.

—Butte, Mont., is going to experiment on the paving question. The street in front of the city hall, for a distance of 100 feet, is to be paved at the expense of the city, and asphalt, granite and wooden blocks are all to be used. What a nice crazy patch it will make!

—The district commissioners are considering a change in the method of sweeping the streets of Washington. When the present contract expires, in about eight months, it is probable that the city will sweep the streets with its own machinery and employees. The contract system has not given proper satisfaction.

—Health Commissioner Curtis, of Albany, N. Y., is inspecting the different garbage reduction systems with a view to recommending one for adoption in his city.

—The Indianapolis board of public works has decided to use wooden street signs, painted black with gold lettering. The blue and white enamel signs heretofore used have not proved satisfactory.

—Hartford, Conn., has voted for a \$25,000 appropriation for a bridge on Park street.

—The city engineer of Houston, Tex., has been ordered to prepare and submit estimates on the cost of paving Washington street with gravel, brick or asphalt.

—A large number of streets at Sioux City, Iowa, will be paved with asphalt and brick next season. Alderman Westcott, chairman of the paving committee, says the contracts will be let by April 1.

—Three members of the council, three members of the board of health and the city engineer of Canton, Ohio, will take a trip for the purpose of investigating garbage reduction plants.

—Plans have been made for the construction of a 30-inch storm and sanitary sewer, to cost \$6,500, along Elysian street, Houston, Tex.

—The city engineer of Houston, Tex., has been instructed to prepare specifications for a 36-inch sewer along Heiner street.

—A sewerage system, to cost \$350,000, is proposed at Galveston, Tex.

—During the present year more than nine miles of asphalt paving have been laid in the city of Brooklyn, and

it is expected that a much larger amount will be laid next season.

—A wooden block pavement, on a 6-inch concrete foundation, is to be laid on First street, Portland, Ore.

—The health department of Chicago has recently put into service the first contagious fever van in this country. The ambulance is built of mahogany, with an elaborate trim of second growth ash, and the wheels have pneumatic tires. Inside, every modern compliance for moving contagious cases has been provided. There is not a scrap of upholstery nor an article that cannot be thoroughly fumigated. A rubber mat covers the floor and a basket stretcher, with a mattress filled with hair, assures comfort and perfect sanitary conditions.

PHILADELPHIA CITY HALL.

The municipal buildings of the city of Philadelphia, commonly called "The City Hall," are, next to the Parliament Houses of London, probably the largest single pile of buildings in the world. The average dimensions of the Parliament Houses are 300 feet by 870 feet, giving an enclosed area of about 251,000 square feet, while those of the City Hall are 435 feet by 435 feet, giving an enclosed area of 189,215 square feet. The City Hall tower is, however, the highest structure of the kind in the world, having a total elevation of 537 feet 11¾ inches, which is only two feet lower than the Washington Monument. The next highest structures are the twin towers of Cologne Cathedral, 510 feet, and the Great Pyramid, 480 feet.

Begun in 1872, it has been twenty-four years in construction and up to the present time has cost the city of Philadelphia \$20,214,727.98. Work on the tower was only completed this fall and much of the interior work on the upper floors is still to be done and a clock placed in the tower with dials each of a diameter of 20 feet. When the building is completed it is expected that all departments of the city government, included under the heads of legislature, executive and judicial, will be centered therein. There are in all more than 500 rooms, with a total floor space of 621,438 superficial feet, or 14½ acres.

The site was selected by popular vote; the building has been constructed under a board of commissioners appointed by act of legislature; work was begun Jan. 27, 1871; ground was formally broken August 16, 1871; the first stone was laid August 12, 1872; the corner-stone was laid in the northwest angle of the tower, with Masonic honors, July 3, 1874; the last block of marble was set in place May 7, 1887, on the tower at the southwest angle, 337 feet 4½ inches from the ground.

There is no small difficulty in deciding under which, if any, of the hitherto established orders or styles of architecture many of the most important structures of the present day can properly be classed. The city hall buildings are of this character. Designed in the spirit of French art, the architecture is essentially modern in its leading features and presents a rich example of what is known by the generic term of the "renaissance," modified and adapted to the varied and extensive requirements of a great American municipality. It consists of a single

building under one roof and is built of white marble. The whole exterior is bold and effective in outline, and rich in detail, being elaborated with highly ornate columns, pilasters, pediments, cornices, enriched windows, and other adornments. The four fronts are similar in design. In the centre of each, an entrance pavilion of 90 feet in width rises to the height of 202 feet 10½ inches, having receding wings of 128 feet elevation. The fronts terminate at the four corners with towers of four feet square and 151 feet high. Archways of 18 feet in width by 36 feet in height, opening through each of the four central pavilions, constitute the four principal entrances to the building, and at the same time afford passages for pedestrians, up and down Broad and Market streets, directly through the buildings. In the centre of the structure is a courtyard 200 feet square and from the north side of this space rises the tower which weighs upwards of 66,000 tons.

The exterior of the building above the basement embraces a principal story of thirty-three feet six inches, a second story of thirty-five feet seven inches, and a third story in the centre pavilions of twenty-six feet six inches, with an attic over of fifteen feet.

The several stories are approached by elevators in groups of four at each corner of the building, besides several single elevators in different parts of the building. An electric elevator is also to be placed in the tower running to the base of the statue. In addition to these means of approach, there are large stairways in the four corners of the building and a grand staircase in each of the centre pavilions on the north, south, and east fronts.

MAYOR OF SOMERSWORTH, N. H.

Col. Christopher H. Wells, mayor of Somersworth, N. H., whose portrait appears in the group of mayors published on another page, was born in that city on July 6, 1853. He attended the public schools, was fitted for college in Somersworth high school, entered Bowdoin in 1871, and graduated in the class of 1875. He studied law with his father, Nathaniel Wells, was admitted to the bar in 1878, and practiced in partnership with Wm. R. Burleigh, formerly of Somersworth, but now of Chicago.

In 1883 Mr. Wells purchased the newspaper and publishing business known as the Free Press Publishing Co., of Somersworth, and later gave up the active practice of law and devoted himself mainly to the newspaper business. He has served two terms in the legislature of New Hampshire and was a member of the constitutional convention of 1889. He bears the title of colonel, being a member of the military staff of Governor Sawyer. He is now serving his third term as mayor of Somersworth. During his mayoralty the city has constructed a water supply system at an expense of about \$160,000, which includes one of the finest pumping stations in New England and a covered sand-filter; also a sewerage system at an expense of \$40,000.

Colonel Wells is a member of the A. F. & A. M., K. of P. and I. O. R. M., the New Hampshire Coon Club, the Suburban Press Association and other social and literary organizations.

NO CITY ARCHITECT.

The Milwaukee common council has just defeated a proposition to create the office of city architect. The idea of the measure was to economize by having one official do all the work, at a salary of \$2,400 a year, for which the city now pays many thousand dollars to various architects. The ordinance provided that the city architect should design and superintend the erection of all buildings that the city should build or remodel. The ordinance was introduced in the council more than two years ago by Alderman Rauschenberger, now mayor of the city. One objection urged to it was that the salary provided was not sufficient to procure the services of a first-class architect, while a large salary would make the office the subject of wire-pulling and political intrigue. Another objection to the measure was that with one salaried architect planning them all, future public buildings would lack the progressive improvements which are stimulated by intelligent competition. On the other hand it was urged that a city architect could always have plans prepared long before they were needed and thus the delay entailed by competition would be avoided. It was suggested that the business of the proposed office could be simplified by the use of the same plans for school buildings of equal size in all parts of the city. While the discussion was in progress a similar idea, but more elaborate, was advanced. It was that the wisest and most economical method would be to have a commission of experts select from among the new school buildings of the city several designs, those most convenient and commodious, and use them, with such modern improvements as the board of public works might suggest from time to time, for buildings to be erected in the future. The ordinance, however, after it had been approved by the committee on salaries, was killed by the committee on public buildings and grounds.

"VAGABOND" LAW SUGGESTED.

The captain of the New York detective bureau urges the police commission to use its influence to have a law passed by the legislature next winter under the provisions of which a person known to be a pickpocket, thief or crook, having no lawful or visible means of support, when found loitering around public places, may be deemed a vagabond and punished by imprisonment for not less than four nor more than twelve months.

This law is similar to the "vagabond" law in force in Massachusetts, which, it is reported, has worked well and has enabled the police authorities of the large cities to keep those cities comparatively free from crooks. As it is at present, in New York and other cities of the state, when a well known crook is arrested on suspicion the magistrate must discharge him for lack of evidence of any specific crime against him.

The rivermen of Pittsburg have petitioned Public Safety Director J. O. Brown for a fireboat to protect the shipping. Councils have appropriated \$40,000 for the purchase of such a boat and bids will soon be asked.

Pittsburg is about to adopt the Bertillon system of identifying criminals.

NOTES OF THE TRADE.

—The Crane-Ordway Co. has sold to the city of St. Paul 4,000 feet of fire engine hose and 1,000 feet of chemical hose for \$4,100.

—William H. Hayden & Co., of Bath, have been very busy putting in new water systems in Maine this fall. They have a force of several hundred men at work in different towns.

—The Studebaker Wagon Co., of South Bend, Ind., has built eight steel wagons for the city of Dayton, Ohio. These wagons are to be used for hauling garbage.

—It is reported that the Indianapolis Water-Works Company has placed an order with the Ingersoll-Sergeant Drill Company for a Pohle air-lift plant of a capacity of 40,000,000 gallons per day.

—The Ahrens Engine Company has just placed an elegant new engine in the Toledo (O.) fire department. The Toledo firemen are highly pleased with their new acquisition.

—The Warren-Scharf Company is laying an asphalt pavement on Hawley street, Binghamton, N. Y.

—The Gleason & Bailey Manufacturing Company, of New York, recently sold a new hook and ladder truck to the Albany fire department.

—Murphy & Ronan, of Albany, have the contract for furnishing three new exercise wagons to the fire department of that city.

—Smith & Caffery, of Syracuse, have the contract for furnishing six new drinking fountains to the water department of that city. Their price is \$17.50 for each fountain, and the article is said to be as good as that heretofore purchased from New York founders at \$40.

—The Aultman Company, of Canton, O., has sold to the city of Lynchburg, Va., a complete outfit for the construction and improvement of roads, consisting of a rock crusher and engine, a steam roller, and a road machine.

—Bids for furnishing fire hose to the Nashville Board of Public Works and Affairs were as follows: Chicago Fire Hose Company, Lion brand, 88.2 cents; J. H. Fall & Co., Test brand, 90 cents; Gutta Percha and Rubber Manufacturing Company, Maltese Cross brand, \$1.

—The Taft Company got the contract for refitting the offices of the City Treasurer and the City Auditor at Hartford, Conn.

—Chief Stetson, of the Minneapolis fire department, has recommended to the Council the purchase of two Vajen-Bader smoke protectors.

—The Rock Asphalt Paving Company secured the contract for the Mill street paving at Rochester, N. Y. Their bid was \$19,685.

—Recent Kansas City paving contracts: Nineteenth street, asphalt, to the Gilson Asphaltum Company, at \$2 per square yard; Fifteenth street, asphalt, to the Barber Asphalt Company, at \$2.25; Twelfth street, brick, to the R. J. Boyd Paving and Construction Company, at \$1.40.

—R. D. Wood & Co., of Philadelphia, got the contract for furnishing the pipe for the improvement and extension of the McKeesport, Pa., water-works.

—The Williamson Pump Company, of New York, will supply the new pumps for the McKeesport water-works.

—The Lindgren-Mahan Chemical Fire Engine Co., of Chicago, has sold to the Milwaukee fire department two combination chemical engines and hose wagons.

—The Michigan Pipe Co. has the contract for the extension of the water-works system at North Tonawanda, N. Y.

—Otis Brothers secured the contract for placing a new elevator in the city hall at Albany, N. Y.

—Julian Scholl & Co., of Springfield, Ohio, recently sold a stone crusher to the city of Norwich, Conn. The city officials are highly pleased with the machine.

—The C. W. H. Moulton Co., of East Cambridge, Mass., has the contract for making a new hose wagon for the Middletown, Conn., fire department.

—The Washington D. C., commissioners have accepted the Brown garbage crematory at the foot of South Capitol street.

—City Engineer Kelsey, of Salt Lake City, has ordered Contractor A. L. Hobson to tear up the asphaltic sand-stone pavement he laid on Second South street. The city engineer had the material submitted to a chemical test and found that it did not meet the requirements of the specifications. The condemned material is a Utah product.

—The public, whose attention has not yet been called to the fact, will be greatly surprised at the progress made within the past year or two in newly perfected apparatus for use in fire departments, by which a fire can now be fought on scientific principles, resulting in a great saving of property from destruction by fire and water, and in saving human lives from the many perilous situations usually brought about in large conflagrations. The greatest accomplishment of the present day is the perfecting of an apparatus which will fully protect the heads of the firemen from fire, smoke and gases, and falling debris, at the same time giving them perfect freedom with the use of the natural organs, by which they are enabled to do good service without being encumbered in any way. By the use of this new invention the firemen can penetrate the dense smoke and locate the flames at the earliest



possible moment, taking advantage of the fire in its early stage before it has had time to spread and communicate to other parts of the building. The new invention to which we refer is made in the shape of a helmet, out of fire-proof leather, fits over the head, can be adjusted as quickly as the ordinary fire hat, and is always found ready when the alarm is given. The occupant receives fresh air for breathing from a connection with a small reservoir which is made secure on the back of the helmet. The reservoir is charged with compressed air and is so

regulated as to furnish the occupant with the necessary air required by him to do good service for one hour. The helmet is scientifically constructed upon new principles, the result of over twenty years labor by the patentees, Willis C. Vajen and William Bader, of Indianapolis. The new invention has received the highest endorsement of the Pacific Coast and International Association of Fire Chiefs, and over a hundred fire departments have been supplied with them within the past ten months, since the helmet has been placed upon the market. It is of personal interest to each individual in close communion with the city government to interest himself and make inquiry, fully informing himself of the merits of this new invention, which is the cheapest investment that any fire department can make, and the most important, as the great battle in fighting a fire in many cases would be rendered mere child's play if it were not for the smoke and poisonous gases which have hitherto proved a barrier to the fireman who has not been supplied with this new invention. See that your firemen are protected and that the fire department is equipped with these helmets and the results will be more satisfactory. A fully descriptive illustrated catalogue of this, the greatest fire-fighting device that has ever been known, will be cheerfully furnished by addressing the Vajen-Bader Company, Indianapolis, Indiana.

HEALTH OF A CITY.

Health Commissioner Kempster, of Milwaukee, lectured recently before the civic section of the College Endowment Association on "A Clean City and Health." In answer to his question, "Does cleanliness pay?" he gave a comprehensive historical sketch of the cleanliness of cities, and spoke of the apparently organized effort on the part of most cities to resist the introduction of proposed sanitary measures, just as they resisted Jenner, when he was introducing vaccination, and Morton and Koch in their discovery of ether and the bacillus of consumption. He spoke of the milk supply of cities, and the system of its delivery, and declared that 10,000 infants in Milwaukee are supplied daily with milk in the delivery of which there are dangers of contamination both from cans and ladles. He added that if general demand were made to have the delivery in glass bottles, the health department would enforce the sterilization of the bottles. He gave as the result of the recent inspection of bakeries that of 247 inspected fewer than 50 were pronounced clean. The ordinance passed afterward, however, produced good results. Dr. Kempster objected to the exhibition of meat and food in the streets, to be covered with dust.

He considered the public schools, presenting a number of reports regarding their unsanitary condition. He spoke of the evils of overcrowding and poor ventilation, and urged personal inspection by parents of cups and towels and other sanitary matters, and when anything is found wrong, he said, word should be sent to the health department. He spoke of the city water supply, told the results of the systematic analysis and made a plea for influence and assistance in the efforts of the department to right its condition.

MUST CARRY OUT THEIR CONTRACTS.

According to Judge Seaman, of the Federal Court at Milwaukee, contractors for public works are compelled to carry out the terms of their contracts or to take the consequences. There has just been decided in his court a claim for \$170,240.28 against the city of Milwaukee. The plaintiffs were Shailer & Schniglau, Chicago contractors, and their claim grew out of the construction of the new intake tunnel in that city. After they had been at work for some time and completed a large part of the tunnel, they began to experience a great deal of trouble in working under the bed of the lake, and they finally told the city officials that they could not complete the work. The city declared that they must either complete the work or the city would do so. The result was that the tunnel was completed by the city under the direction of City Engineer Benzenberg. The contractors thereupon sued the city for the amount due and to become due if they had completed the contract themselves. The city claimed that it had expended, in order to complete the tunnel, the sum of \$113,226.78, over and above what it would have paid the contractors had they completed the work. The city therefore made a counter-claim for damages. The trial of the case lasted about ten days. After all the testimony had been taken, the city attorney moved that the jury be instructed to return a verdict against the plaintiffs and the court granted the motion. One of the claims of the contractors was that the ground in which they had to work was much more difficult and expensive than the borings made by the city engineer, and upon which their bid was based, had indicated. The city succeeded in controverting this claim and the contractors had nothing to stand upon. The intake tunnel contract was awarded July 14, 1890, the price being \$250,000. When the contractors quit work, which was Oct. 1, 1893, they had received from the city, on estimates made from time to time, the sum of \$79,759.

PARISIAN HEALTH MEASURE.

—The New York Herald's European edition states that at the last meeting of the Paris Conseil d'Hygiene et de Salubrite de la Seine M. Nocard ascribed without hesitation a large share of the odor in some parts of the city to the putrefaction of butchers' refuse, and pointed out a very simple means of preventing it. M. Nocard explained that during warm weather butchers' refuse decomposed very rapidly and emitted most offensive odors. To do away with these bad odors he advises that all butchers shall be required to keep a non-metallic receptacle containing a two per cent. solution of chloride of zinc, in which all bones and meat scraps shall be immersed. This solution is perfectly harmless and inexpensive. While not strong enough to disinfect decomposing meat it is strong enough to prevent the beginning of putrid fermentation.

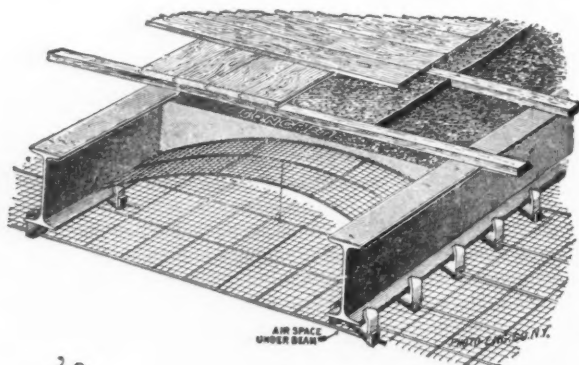
CITY GOVERNMENT has on its subscription list the mayor of nearly every important municipality in the United States. Thousands of other city officials have also recognized the value of this publication by sending in their subscriptions.

TESTS OF FIRE-PROOF CONSTRUCTION.

BY A. L. A. HIMMELWRIGHT, C. E.

The lofty buildings which have sprung up in the business portions of large cities owe their existence to necessity, and are possible because of the reduced cost of iron and steel since 1888 and the perfected elevator mechanism. High buildings have created an increased demand for fire-proof construction. Until recently the fire-clay products, common bricks or hollow blocks, have been exclusively employed. While this construction was satisfactory in many respects, its comparatively high cost led to the introduction of many other forms of construction designed to fulfill the requirements at a reduced cost. The activity in this new field for invention is shown by the fact that forty-seven different systems of fire-proof construction were submitted to the Department of Buildings of New York City for approval prior to September 1, 1896. The lack of exact knowledge respecting these various systems and the necessity of ascertaining their relative efficiency and fire-proof qualities has actuated the Department of Buildings to conduct a series of careful and exhaustive tests. It is proposed to subject each system to equal fire and water tests under identical conditions. For this purpose structures are to be erected according to approved plans, in each of which a sample floor is to be constructed as proposed under contract, by the representatives of each system.

The first of these series of tests was made at New York City, on September 3, 1896. The construction tested was the Roebling system, the details of which are shown



in the accompanying cut. It consists of a wire cloth arch, stiffened by steel rods at nine-inch intervals. This arch is sprung between the iron floor beams and abuts into the seat formed by the web and the lower flange. Portland cement concrete is placed upon this iron arch and finished level with the top of the iron beams. The concrete used in this case consisted of one part of Aalborg Portland cement, two parts of ordinary brown sand and five parts of steam ashes. The ceiling construction consisted of a series of supported rods spaced about 16 inches apart and attached to the lower flange of the floor beams by clamps, offsetting the rods one inch below the beams. To these rods stiffened wire lathing was securely laced. The plaster for the ceiling was furnished by the United States Mortar Supply Company, and consisted of their regular machine-mixed product, gauged with plaster of Paris.

The test structure was a steel frame, brick building, 12 feet wide and 16 feet long, and about 14 feet high. A double grate embracing the entire area in the interior had been built in the lower part of the structure; one near the ground level and the other about three feet above the first. The floor to be tested was about 10 feet above the level of the upper grate and consisted of three 4-foot arches, supported by 10-inch 25-lb. beams. Four chimneys built over openings in the floor at the corners furnished the required draft.

Over the middle arch, comprising 64 square feet, was placed the safe load, as prescribed by the New York City building laws—150 pounds per square foot, or a total load of 9,600 pounds. The necessary levels having been taken to determine the subsequent deflections, if any, dry cord wood and shavings were piled to a depth of about two feet over the grate. At 11:10 A. M. the fire was started.

An Uehling & Steinbart pyrometer had been provided by the Building Department, capable of registering temperature up to 2,500 degrees. Sixteen minutes after the fire was started the pyrometer recorded a temperature of 1,150 degrees. More wood was fed into the building through the grate openings and through a space corresponding to a door, the draught being regulated by sheet iron doors. The temperatures recorded were as follows:

Time.	Degrees (Fahrenheit).
11:30	1,300
11:37	1,600
11:42	1,800
11:55	1,900
12:00	1,990
12:07	2,150

After 12:07 o'clock the temperature ranged from 2,150 to 2,400 degrees. The plaster ceiling under the floor remained intact until about 12:45, when a portion of the brown plaster coat, about two feet square, fell away from the middle portion of the ceiling. At 12:50 the flames were extinguished by the fire department. The hose was directed against the ceiling and interior walls for about ten minutes, after which the floor was flooded on the top to the depth of four inches.

It was impossible because of the heat to make a critical examination of the interior until the following day. It was then ascertained that the floor was free from cracks and practically uninjured. Careful levelling revealed the surprising fact that the iron beams had deflected less than one-eighth of an inch. The flat ceiling construction had been purposely omitted over about one-quarter of the area, exposing the wire cantering and concrete to the direct action of the flames. The wire netting of this portion of the floor was destroyed, but the steel ribs and the concrete remained in good condition.

Actual fires in ordinary buildings have been known to develop temperatures of 1,800 to 2,000 degrees for periods of an hour or more before the combustible material was consumed. At temperatures above 1,200 degrees the strength of structural iron becomes seriously impaired. The problem is to devise some means by which the iron work may be protected and its temperature kept below 1,200 degrees.

In many forms of fire-proof construction the iron beams are protected by a lip or projection of brick, or are incased in a covering of some plastic material that subsequently hardens. But when this protecting material is in contact with the iron, it must necessarily transmit to the iron the same degree of heat that has been imparted by the fire to the protecting material.

Iron being an excellent conductor of heat, it follows that when it attains a temperature of 1,200 degrees or more, speedy failure is expected. If, on the other hand, a fire-resisting surface be suspended some distance from or below the iron beams free from contact with them, and the surface be heated to a high temperature, the heat would be transmitted to the iron-work only by radiation through the enclosed air, a very slow process which retards injury.

In actual fire-proof buildings the air space of the system tested constitutes a large air reservoir averaging four inches in depth between the ceiling and concrete floor, and extending continuously throughout an entire story. In case of a fire the heat is usually local in one or more rooms. The ceilings above these rooms would become very hot, and the air above the ceilings would begin to circulate, the air space supplying a constant flow of cooler air. In practice, therefore, the heating of the iron-work would be further retarded by the circulation of cool air under it.

The official tests of other systems of fire-proof construction are to follow. These tests will prove highly interesting and instructive to architects, engineers and city officials in charge of buildings. A detailed record of the results of all the tests, when complete, will make a valuable volume.

ANOTHER TEST.

A fire-proof floor, consisting of porous terra-cotta blocks, was subjected to a similar fire and water test on September 29, 1896, at the northeast corner of 68th street and Avenue A, New York City. The floor was furnished and erected by the Central Fire-proofing Company, and was intended to represent the standard construction as used in New York City.

The floor, as submitted for test was, however, of special construction and did not represent the usual practice. The blocks were deeper for the given arrangement of the iron-work, and the cement, mortar and concrete filling of much better quality than is ordinarily used. In view of these facts the Building Department refused to accept the construction as a typical one, but was willing to conduct the test.

The dimensions of the test structure and the spacing and size of the iron beams were identical with the preceding test, made on September 3. The spaces between the beams were filled by Raritan, porous terra-cotta, end construction, sectional, hollow brick, 10 inches in depth, with a lug or flange extending under and protecting the lower flange of the iron beams. The brick were set with cement mortar, consisting of one part of Dyckerhoff cement to one part of sand. Machine mixed plaster about half an inch in thickness was applied to the under side of the hollow brick over about two-thirds of the area

of the ceiling, the brick being exposed to the flames over the remaining area of the ceiling.

Wood sleepers, two by three inches, were laid crosswise over the iron beams at intervals of about 16 inches, and cinder concrete consisting of one part of Portland cement to three parts of sand and five parts of cinder was filled in and well rammed above the hollow brick and levelled flush with the top of the nailing sleepers, thus making a stratum of about three inches of concrete; the safe load of 150 pounds per square foot, consisting of common brick, was distributed over the middle arch, which, as before, constituted about one-third of the area of the floor.

The plaster on the ceiling, after the application of this load, at about 8:40 A. M., of the day of the test, showed small transverse cracks corresponding to the joints of the hollow brick. A layer of hard cord-wood, about 18 inches in depth, covered the grate, the latter being arranged as in the preceding test. The fire was started at 9 A. M. and maintained until 3 P. M., when it was extinguished by the fire department.

After the building had cooled off sufficiently to inspect the interior, it was found that the stream of water had destroyed and carried away the lower surface of the hollow brick, exposing the hollow spaces over an area of about 25 square feet in the centre of the ceiling. The superimposed load was practically supported by the nailing sleepers and concrete; the latter remaining intact and uninjured.

Owing to some difficulty with the pyrometer no temperatures were registered during this test. Copper wire coiled around an iron rod and inserted through the brick wall was fused; this indicated a temperature of 2,000 degrees. The fire was occasionally allowed to run down, however, so that the temperature probably ranged from 1,800 to 2,300 degrees.

Although the lack of actual temperatures is a serious deficiency in this test and robs it of much scientific value, the test was, nevertheless, interesting as illustrating the best possible results that can be obtained in the very highest form of flat arch, hollow brick construction.

MUNICIPAL OWNERSHIP.

A recent editorial in the Providence "Journal" says that at a convention of street-lighting officials, held a short time ago in New Haven, the papers read tended to show that the cheapest service in street lighting is obtained from private corporations. It was also said that in some cases politicians had wasted enough to give a well-managed company a large profit.

This presents one phase of the problem whether street lighting, water service, etc., should be under municipal or private ownership. Cheapness of service is a highly important consideration, and it is possible that taking the evidence of all large cities in which there is municipal ownership the cost is lighter when the work is done by a private corporation. It should be borne in mind, however, that this includes a consideration of those cases where corrupt politicians have used that branch of the municipal government for political purposes at the expense of good and economical service.

It may be said that the experience of American cities does not justify the belief that honest service would be obtained if street lighting and water service were under

control of the municipal government. In this there is much force. Municipal government should be reformed, and the way to do that is to adopt a system of civil service which would require offices to be given according to merit, and not according to the whim or corrupt design of some ward politician. There is as much need of civil service reform in cities as there is in the general government. A system of classified service would do away in a great measure with corrupt political influences in the administration of water and light departments. In that case better and more economical service should be obtained through municipal than through private ownership.

There is another and more important consideration which suggests that municipal ownership should prevail in regard to not only lighting and water, but also in street-car service. The evil of political manipulation in a single department of a city government may be very great, but it is not so great an evil as the interference of a private corporation in practically every department of the city government. The latter evil is what is seen in cases where a street-car company or a water company throws the whole weight of its influence into municipal politics and demands that the government of the city shall be run in its interests. It would be ten times better for the people of any city if they, as a municipality, owned the electric light works, the water-works and the street-car systems. There might be defective service in those departments, but it would be possible to improve it, and the city would at least not have to stand still and wait for permission from some private corporation to do this or that.

The truth is that all of what are called natural monopolies should be under the care of the public, represented by the state, the nation or the municipality. In connection with it, it should be a system of classified service in reference to public office or employment, which would do away with much of the corruption that exists under what is known as the spoils system. Good service would be obtained and the municipality could be conducted in much the same way that a man conducts his private business.

A municipality is simply a big corporation, in which the tax-payers—and this includes every man who has a permanent residence in the city—are the stockholders. The mayor and the city council act as president and board of directors. How long could a big railroad corporation keep out of the hands of a receiver if its officials were chosen, not on the ground of experience, efficiency and integrity, but because they happened to have the same ideas on national politics that were held by a majority of the stockholders of the company? How many of us would care to entrust our lives to the tender mercies of a railroad company that was run in such a manner?

What would be thought of a party of settlers in a frontier village who, when attacked by a band of Indians should start in fighting each other in regard to whether the United States ought or ought not to recognize the independence of Cuba? Yet this is just about what American municipalities have been doing, year after year. The result we see all around us in every large city of the country, extravagance, inefficiency and robbery being so much the rule that an exception, whenever one is found, is regarded with open-eyed astonishment.—Los Angeles "Times."

A SAFEGUARD TO PROPERTY.—A new device for fighting fire was exhibited recently at Broad street and Exchange place, New York City, at the special request of the insurance companies of New York. The device referred to is the Little Giant fire extinguisher, controlled by the Little Giant Fire Extinguisher Company, a company duly incorporated under the laws of New York state, and having as its directors many well-known insurance

men of New York City. The tests given consisted in extinguishing in a remarkably short time (but a few seconds) a most severe fire built in a wooden frame structure, 15 x 6 x 4 feet, filled with excelsior, kindling wood, shavings, etc. One test was to represent a room and the second test an open box. There was no addition of oil or other highly inflammable materials, which oftentimes leaves in doubt the true value of an extinguisher in case of fires such as usually occur. So impressed were we with the fact that such a small apparatus could so successfully extinguish a fire of such magnitude that we called at the office of the company, where we learned that this is the extinguisher which has been accepted by the authorities of New York City for protection against fire in the municipal buildings; the bill having been passed by the board of aldermen by a vote of 25 to 2 and later signed by Mayor Strong. A similar bill has also been passed by the common council of Brooklyn, which proves a well-founded appreciation with which the extinguisher is received by our city authorities. We were also informed that the Little Giant fire extinguisher is in use by the fire departments of New York, Philadelphia, Jersey City and other places, and that the reports coming from these sources form a continuous record of success. We were shown the reports of many actual fires which have been extinguished by the Little Giant fire extinguisher with the saving of many thousands of dollars, and in one instance, at least, the undoubted saving of life. Among the fires recorded are those occurring from explosions of gasoline and kerosene oil stoves and kerosene lamps; alcoholic liquors, clothing, bedding, waste material, tar, grease; in fact, almost every conceivable inflammable material, and occurring under all conditions, as between floors and ceilings and within partitions. In not a single instance has the Little Giant failed to meet every test submitted to its powers. Among the many testimonials shown us were well-spoken words from the delegates to the firemen's conventions of the states of Pennsylvania, Connecticut and Massachusetts, as well as from chiefs of fire departments from all portions of the country. Regarding the extinguisher, a short description may be of interest to our readers. It is a tube about fourteen inches in length and three inches in diameter, weighing three pounds, hermetically sealed, and so constructed that a blow of its point upon any hard substance, or a twist of the handle opens the extinguisher, after which the fluid contained therein is expelled by jets, each of which is sufficient to extinguish a fire of no small size. The mechanism of the extinguisher is somewhat similar to that of an ordinary syringe, and is so arranged that about fifteen pressures of the handle are required before the contents of the extinguisher are exhausted. The extinguisher is guaranteed against corrosion—a defect which renders the majority of other extinguishers useless within a comparatively short space of time. The main points of value possessed by the extinguisher are its small size and weight, its simple mechanism (which renders it of equal value in the hands of any man, woman or child), its efficacy, which has been thoroughly tested, and its low price. We can heartily recommend to our readers this wonderful fire fighter, believing to be forewarned is forearmed, and with a general adoption of this fire destroyer our danger of loss of property and life from fire would be brought to a minimum.

WHAT OTHERS SAY OF US.

I find CITY GOVERNMENT to be up to the standard on municipal questions. Its publication must result in a better understanding of such problems.—W. D. Wood, Mayor, Seattle, Wash.

I consider CITY GOVERNMENT a very valuable publication. I have received the last two numbers and have read them with great interest. I find much valuable information in your columns. The question of municipal government is one of the great problems before the American people, and all city officials should be interested in knowing what has been done in the government of municipalities throughout the land. The question of pure and cheap water, proper fire and police protection, the right kind of paving, the proper management of all municipal improvements, relations between the city government and corporations holding franchises thereunder, the proper preservation of the health of the community and the proper management of the financial affairs of the city are questions deserving careful consideration of thoughtful citizens.—T. S. McMurray, Mayor, Denver.

The more I see of CITY GOVERNMENT the more I am pleased with it. It is a great source of information for city officials who are interested in giving their respective cities the best possible administrations.—Horace J. Farrar, city clerk, Quincy, Ill.

I am a subscriber to CITY GOVERNMENT and heartily endorse its objects and methods, and wish you great success in its publication.—S. G. Heiskell, Mayor of Knoxville, Tenn.

It seems very wise on your part to recognize that schools and libraries form an interesting and important part in city government. I sincerely hope and believe that all progressive librarians will give you their cordial support.—Theresa West, librarian Milwaukee public library.

"City Government," New York and Chicago, for October, has a long and detailed description of Brooklyn's present Administration, with portraits of more than a hundred of its members. The article shows how municipal business is handled here. Other articles include:

Philadelphia's gas plant, a comprehensive review of the experience of the city in owning and operating a gas plant; Mayors on Franchises; Mayors Wurster, of Brooklyn; Taggart, Indianapolis; Doran, of St. Paul, McGuire, of Syracuse, Ochs, Chattanooga, and MacVicar of Des Moines, express their views on the franchise question; The Great Boston Subway, full particulars about the immense work of placing Boston street cars underground; Wilmington's Intercepting Sewer, the engineer in charge tells about this important improvement; Work of Libraries, Anna R. Weeks writes about the grand work of American free public libraries; American Society of Municipal Improvements, the coming convention of an organization calculated to do much good for American municipalities.—Brooklyn Citizen.

I have examined City Government and find it a very valuable magazine. It should be in the hands of every alderman in the Union.—Herman Becker, city clerk, Peekin, Ill.

I think City Government is the best work of its kind that has ever been published.—Francis E. Clark, mayor, Bridgeport, Conn.

A bright, up-to-date and interesting monthly called "City Government" has just made its appearance for the third time, and with its eight newsy and well-edited departments it proves very interesting reading.

Some of the features this month are: Philadelphia's gas plant, mayors on franchise, city government of Brooklyn, bicycle ordinance in Paris, mayors of Ohio and the like.

The magazine is profusely illustrated with excellent half-tone cuts, and is a most interesting and instructive periodical for all classes and ages of readers.—Brooklyn Times.

A very interesting article on the city government of Brooklyn is published in the current issue of "City Government," a monthly magazine published in New York City and Chicago. The magazine is devoted to the practical affairs of municipalities, and is intended for city officials and those who are specially interested in municipal government. The October number is largely given up to Brooklyn. Aside from the article which tells about every department of the city, Mayor Wurster has contributed an interesting article on the municipal franchise question. The Mayor gives his views as to the manner in which the corporations should reimburse the city for the privileges extended to them. The chief magistrates of several other cities also furnish contributions on the same subject.

The title page of the magazine is decorated with an engraving of the Memorial Arch at the entrance to Prospect Park, showing the position in which the figures that are to adorn the top of the arch will be placed. The number also contains handsome half-tone portraits of Mayor Wurster and all the members of his cabinet, as well as of a great many of the subordinates in the city departments; portraits of the members and clerks of the Common Council, of Sheriff Buttling, Coroner Coombs and other county officials; the chief officials and all the captains of the Police Department and the officials of the Brooklyn Fire Department.

There are many articles of an interesting character pertaining to city government in the publication.—Brooklyn Standard-Union.

In the October number of the "City Government," a monthly magazine devoted to the practical affairs of municipalities, published in New York and Chicago, there is a comprehensive and excellently illustrated article of considerable extent on the city government of Brooklyn. The article in question, as well as the matter to which the other pages of the magazine are devoted, form a collection of facts of ready reference, and well worth preservation.

The article on Brooklyn contains by way of illustrations a full page group of pictures of Mayor Wurster and his cabinet, another page of prominent officials in the various departments, a double page group of the police captains of the city, one of the members and clerks to the common council, one of the fire department heads, and an excellent half column portrait of Sheriff Buttlng.

These illustrations are accompanied by reading matter concise in form and yet fully explanatory in nature. The terms of the various officials, the appointing power, the districts which they represent, the functions of departments and brief details of work done are all given, supplemented by short biographies of the men who are prominent in the city's municipal life. Pictures and reading matter are clearly and concisely presented, and the issue will doubtless be one of much interest, not only to the men treated of, but to the residents of the city at large as a thing of considerable reference value.

The frontispiece of the magazine is a view of the arch at the entrance to Prospect Park, as it will appear when completed.—Brooklyn Eagle.

—The National Association of Commissioners and Inspectors of Buildings met at Buffalo last month. The following officers were re-elected: President, John S. Damrell, Boston; vice presidents, John M. Hazen, of Minneapolis, P. Lacroix, of Montreal, William H. Cole, of Camden, N. J.; J. B. Brady, of Washington, D. C.; W. C. Haddock, of Philadelphia; secretary, James J. Barry, of Boston; treasurer, J. Theodore Oster, of Baltimore.

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